U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
PB-277 891

A National Environmental/Energy Workforce Assessment. Region III

National Field Research Center, Inc, Iowa City, Iowa

Prepared for

Environmental Protection Agency, Washington, D C

Dec 77

PB 277 891

A National Environmental/Energy Workforce Assessment

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U. S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

Conducted by:

National Field Research Center, Inc.

P.O. Box 287

Iowa City, Iowa 52240

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO. PB277891
4. TITLE AND SUBTITLE A NATIONAL ENVIRONMENTAL/ENERGY WORKFORCE ASSESSMENT, Region III		5. REPORT DATE December 1977 - Date of Completion 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) National Field Research Center, Inc.		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS National Field Research Center, Inc. P.O. Box 287 Iowa City, Iowa 52240		10. PROGRAM ELEMENT NO. 2BC651 (36) 11. CONTRACT/GRANT NO. Grant #T900591010
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency Office of Federal Activities (A-104) 401 M Street, S.W. Washington, D.C. 20460		13. TYPE OF REPORT AND PERIOD COVERED Phase I Final Report 14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES Phase II will comprise approximately five volumes and will be available in September 1978. Phase III will be available in September 1979.

16. ABSTRACT

This study is one of 70 volumes assessing the workforce needs (manpower needs) for pollution control and abatement in the United States for the five-year period of 1976 through 1981. Seven fields for pollution control — air, noise, pesticides, potable water, radiation, solid waste, and wastewater — are analyzed, together with energy-related programs currently accentuated by the national effort to solve energy supply problems.

Designed as Phase I of a three-phase program, the complete assessment includes the following volumes: one each for the 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands; one for each of the ten EPA regions; a one-volume National Abstract; a volume on National Legislation; a volume on Business and Industry; and a four-volume National Summary. The information was gathered through extensive personal interviews with responsible federal, state, and local officials in every state; with officials of representative private industrial and commercial firms; and with representatives of national industrial and trade organizations.

Phase II will develop a broad national inventory of the entire range of post-secondary and higher education training offered in the pollution control and energy areas cited above, and Phase III will offer demonstrations for curriculum changes or modifications which appear necessary to assure an adequate and properly trained national environmental/energy workforce.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Planning Regional Planning State Planning State Agencies Federal Government Planning Labor Force Manpower Forecasting	Employment Economic Surveys Energy Management Pollution Control Environmental Management Environmental Education Environmental Sciences Conservation Environment	National Environmental/Energy Workforce Assessment	

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS (This Report)	21. NO. OF PAGES
Release Unlimited		111
	20. SECURITY CLASS (This page)	22. PRICE PCA06 MFA01

EPA Form 2220-1 (9-73)

NATIONAL ENVIRONMENTAL/ENERGY

WORKFORCE ASSESSMENT

for

REGION III

Conducted by:

NATIONAL FIELD RESEARCH CENTER, INC

Under Grant from:

UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

Grant #T900591010

1977

This document has been reviewed by the Environmental Protection Agency and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

National
Field
Research
Center, Inc.

Box 287 Iowa City, Iowa 52240 (319) 351-8789

INTRODUCTORY NOTE

The National Environmental/Energy Workforce Assessment was conducted by National Field Research Center, Inc. with main offices in Iowa City, Iowa. The following personnel have had primary responsibility for the Assessment and project report.

IOWA CITY, IOWA
- Dr. Darold E. Albright, President
- Paul E. Bridges, Executive Director
- Dr. Richard L. Benesh, Project Director
- Judith J. Gordon
- Alan M. Stowell
- Anita M. Stowell
- Mary Kay (Edge) Wade

ATLANTA, GEORGIA
- Elizabeth G. Nielsen, Regional Director
- Robert Oxberger

DENVER, COLORADO
- Nancy C. Dillenberg, Regional Director

SEATTLE, WASHINGTON
- Steven Silva, Regional Director

WASHINGTON, D.C.
- Frank E. Smith, Project Coordinator
- Lloyd B. Chaisson, Assistant Project Coordinator
- Jack F. Seum

Additional research and clerical assistance was provided by Frederick M. Wall, Maxine Wolfe, Margaret Fehn, Sandra Hogsed, Karen Kirchoff, Sharon Leiker, Marilyn Low, Mary McCormac, and Joan Urquhart.

FIELD OFFICES

ATLANTA
2700 Cumberland Pkwy
Suite 150
Atlanta, GA 30339
(404) 433-2844

DENVER
2600 S. Parker Rd.
Suite 160, No. 6
Denver, CO 80232
(303) 751-4982

SEATTLE
927 United Pacific Bldg.
1000 2nd Ave
Seattle, WA 98101
(206) 623-8170

WASHINGTON, D.C.
1522 K Street, N.W.
Suite 600
Washington, D.C. 20005
(202) 223-9138

TABLE OF CONTENTS

	Page
ILLUSTRATIONS	iii
ACKNOWLEDGEMENT	v
PREFACE	vi
FOREWORD	vii
REGIONAL PROFILE	2
ORGANIZATIONAL AND OPERATIONAL STRUCTURE OF U.S. REGION III	5
REGIONAL POLLUTION CONTROL AND ABATEMENT PROGRAMS	13
I. Air	14
II. Noise	19
III. Pesticides	25
IV. Potable Water	33
V. Radiation	40
VI. Solid Waste	46
VII. Wastewater	53
VIII. Energy	61
SUMMARY	66
BIBLIOGRAPHY	69

ILLUSTRATIONS

Figure		Page
1	U.S. Environmental Protection Agency, Region III, Organizational Chart	9
2	Air and Hazardous Materials Division, Region III, Organizational Chart	10
3	Water Division, Region III, Organizational Chart	11
4	Surveillance and Analysis Division, Region III, Organizational Chart	12
5	Federal Energy Administration, Region III, Organizational Chart	65
Table		
I	U.S. EPA Region III, Current (1976) Staffing Level	8
II	U.S. EPA Region III, Current (1976) Air Pollution Control Staffing Level	15
III	U.S. EPA Region III, Workforce Projections to 1982 for Air Pollution Control	16
IV	U.S. EPA Region III, Workforce Projections to 1982 for Noise Control	21
V	U.S. EPA Region III, Current (1976) Pesticide Workforce Staffing Levels	27
VI	U.S. EPA Region III, Workforce Projections to 1982 for Pesticides	29
VII	U.S. EPA Region III, Current (1976) Potable Water Staffing Level	34
VIII	U.S. EPA Region III, Workforce Projections to 1982 for Potable Water	35
IX	Training Packages Currently Being Developed By The Office Of Water Supply, United States Environmental Protection Agency, Under Phase I Of Its National Training Strategy Which Will Impact Region III	38

Table		Page
X	U.S. EPA Region III, Workforce Projections to 1982 for Radiation	42
XI	U.S. EPA Region III, Current (1976) Solid Waste Staffing Level	48
XII	U.S. EPA Region III, Workforce Projections to 1982 for Solid Waste	50
XIII	U.S. EPA Region III, Current (1976) Wastewater Staffing Level	56
XIV	U.S. EPA Region III, Workforce Projections to 1982 for Wastewater	57

ACKNOWLEDGEMENT

This environmental manpower assessment for Region III EPA owes much of its success to the invaluable assistance and cooperation of individuals working in EPA, both in headquarters and in the regional office in Philadelphia. Particular gratitude is owed to Mr. John Ropes and Mr. Michael Moore of EPA's Office of Education and Manpower Planning for their assistance in providing guidance and direction to our research staff.

Mr. George Dukes, the Regional Manpower Officer for Region III, and Ms. Helen Nowak, Manpower Development Specialist, are also deserving of a special mention for the many hours of their time they gave to our researchers, and for the enthusiasm and concern with which they participated in this study.

Several other individuals within EPA's Region III office were especially helpful in providing insights and information for the study. Among these, particular thanks is extended to:

Mr. Robert Allen, Chief, Hazardous Materials Branch

Mr. Robert Blanco, Chief, Water Planning Branch

Mr. Nelson Davis, Chief, Pesticides Branch

Mr. James Elder, Director, Management Division

Mr. Joseph Galda, Chief, Facilities Management Branch

Mr. Pat Gorman, Special Assistant to the Regional Administrator

Mr. Greene Jones, Director, Water Programs Division

Mr. Ray Lee, Water Supply Branch

Mr. Israel Milner, Air Programs Branch

Mr. Richard Pastor, Water Planning Branch

Mr. George Pence, Chief, Environmental Impacts Branch

Mr. Gordon Rapier, Director, Air & Hazardous Materials Division.

PREFACE

This regional report represents a detailed summation of existing workforce levels, training and certification programs, career potential, and staffing level projections through 1981 for EPA Region III Headquarters. It also examines the seven areas of pollution control and abatement activities (air, noise, pesticides, potable water, radiation, solid waste, and wastewater) over which EPA has varying degrees of statutory authority. The study was undertaken by National Field Research Center to provide the Office of Federal Activities (OFA) of the EPA with a strategy for supporting and implementing educational and occupational programs based on those needs and growth trends evidenced from the initial workforce assessment designated as Phase I of a three phase program.

The information presented in this regional report was compiled mainly through personal interviews with program administrators as well as various planning documents supplied by them. Where actual long term workforce planning had not been approached by a specific program, the individuals interviewed were requested to speculate, within the realm of their best professional judgement, on what they realistically perceived their workforce increases would be over the next five years.

FOREWORD

The following report represents five year projections for staffing levels of the seven major pollution control and abatement programs within EPA Region III. Individual narrative abstracts of training, workforce profiles and projections, and career potential are addressed within each program with a final remark included in each section to provide a brief overview. The specific pollution programs considered by this study come under the regulatory auspices of EPA and include air, noise, pesticides, potable water, radiation, solid waste, and wastewater. The content of each program section in this report is limited to the control authorities which EPA possesses. Additionally, the report includes summaries of federal energy-related programs pertaining to Region III which have significant activities addressing the problems of polluting byproducts of energy generation and transmission.

It must be noted that all the regulatory programs of EPA Region III are not segregated into autonomous sections. In fact, various functions overlap; interdivisional responsibilities exist; and certain components of all pollution activities are integrated into central support programs to avoid duplication. Examples of these centralized service programs include the Enforcement Division, the Surveillance and Analysis Division, and the Management Division which perform similar tasks for each of the pollution control programs yet remain independent.

A large portion of the information contained in this Regional report represents the best professional judgements of those persons surveyed. In cases where more than one person provided judgements concerning expected real workforce growth in a specific program area, the resultant

projections were determined by the National Field Research Center staff through a step-by-step comparative analysis of all planning documents as well as all data collected during interviews.

National Environmental Energy Workforce Assessment

Phase I

REGION III

Report

1

REGIONAL PROFILE

Region III, also known as the Middle Atlantic Region, is located in the northeastern sector of the United States. The region has a population of over twenty-three million people - almost 12 percent of the nation's total population. It stretches from the Atlantic Ocean on the eastern side to the Appalachian Mountains on the west. The region abounds with industry, farming, mining and recreational activities. Many of the environmental and economic problems are shared with the other regions in the northeast.

The region contains five states and one autonomous municipality, the District of Columbia. These six entities represent a diversity in area and population. The largest in the region, Pennsylvania, is third largest of the states in population with 11,793,909 people and has an area of 44,966 square miles. The smallest state in the region in population is Delaware, which ranks 47th in the nation with 548,104 people. The District of Columbia is the smallest in area with 67 square miles. In four of the states - Delaware, Maryland, Pennsylvania, and Virginia, population increased between 1960 and 1970, it declined in the District of Columbia and West Virginia. Overall, the region experienced a substantial increase in population during this period.

The states are heavily urban and industrialized. Four of them have urban populations amounting to over 70 percent of the total population. Only West Virginia has a population more heavily rural than urban. All but two of the states had higher per capita incomes in 1975 than the national average. Delaware and D.C. had two of the highest levels in the country.

The concentration of industry in the region is a major factor in the economic stability. Particularly significant to the region is the production of chemicals, textiles, food products, wood products, and metals. Pennsylvania is the nation's largest producer of primary metals, mainly steel, and steel production is the state's largest industry. West Virginia, Delaware, and Virginia are major chemical producers. Chemicals account for 36 percent of the manufacturing in West Virginia.

The Atlantic Ocean is a significant industrial resource to three of the region's states. Commercial fishing is a major industry in Maryland and Delaware and accounts for a large portion of the food products. Major seaports in Maryland and Virginia are important components of the industrial development of those states.

Agricultural and mineral resources are also important to the economy in Region III. Farming is a major industry in all the areas except the District of Columbia. Delaware has the smallest number with 3,710 farms covering 673,895 acres and Virginia is the largest with its 64,572 farms over 10,649,862 acres. Dairy and poultry products account for much of the farm production, along with abundant crops of apples and peaches. Tobacco is another important crop to Virginia and Maryland. Forests cover a large portion of the land in West Virginia where 79 percent of the state is forested and in Maryland where they comprise almost one-half of the total land area.

Most of the states in Region III have extensive mineral resources with coal being the most significant. Coal is an important commodity of the states of West Virginia, Pennsylvania and Virginia. West Virginia is

the fifth largest state in the nation in mineral production; coal accounts for 94 percent of this production. Seventeen percent of the total U.S. production of bituminous coal comes from West Virginia. The third largest state in output of bituminous coal is Pennsylvania, which also produces almost all of the nation's anthracite coal. In Virginia, coal makes up 70 percent of the state's total mineral production. Other minerals important to the region include petroleum, natural gas, stone, lime and zinc. West Virginia produces more natural gas than any other state east of the Mississippi River.

The vast agricultural and mineral resources, along with extensive industrial development on which the economy of Region III is dependent, have also created pollution problems in the air, on the land, and in the waters of the Region. Protecting the quality of the environment, while ensuring the continuation of a prosperous economy, will require the cooperative effort of all levels of government, industry, and the public. Meeting this challenge will depend on the amount of trained personnel, and financial and technical resources that are available to accomplish this task in future years.

Organizational and Operational Structure

EPA's Region III Office in Philadelphia is responsible for accomplishing the nation's environmental program objectives in a six state region which includes Delaware, the District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia. These objectives include the development and implementation of a comprehensive and integrated program of environmental protection activities. The regional office works with EPA Headquarters staff in Washington to translate program direction and evaluation into effective operating programs in the region. The office also provides assistance to the states in developing environmental plans and has the authority to approve state standards and implementation plans.

The Regional Office contains a headquarters staff and five operational divisions. The headquarters staff includes the Regional Administrator, Deputy Regional Administrator, and five staff offices: the Office of the Regional Counsel, Office of Congressional and Public Affairs, Office of Civil Rights, Office of Research and Development, and the State Coordinators.

The operational divisions and their functions, according to the Organization and Functions of the EPA Regional Offices is as follows:

1. Management Division - Provides planning and management advice and services and administrative management support to all components of the Regional Office. The Division functions include personnel management, financial management, regional program planning, automatic data processing, safety and security, library services, facilities and space management, and general services.

2. Enforcement Division - Recommends goals, priorities, and objectives for Regional Enforcement of Industrial Permits, Municipal Permits, air pollution sources and violations of other environmental laws dealing with pesticides, noise, drinking water, etc.; and is responsible for the development, coordination, implementation, and evaluation of these programs. Evaluates current

compliance status within the Region, establishes goals and priorities for improving the degree of compliance, and selects strategies and techniques for achieving improvement. Provides guidance to the Surveillance and Analysis Division with respect to data needed to determine compliance status and to support enforcement actions, and determines the need for nonlegal or legal corrective action based on information from agency and non-agency sources.

3. Air and Hazardous Materials Division - Recommends goals, priorities, and objectives for the Regional Air, Noise, Radiation, Pesticides, Toxic Substances, and Solid Waste Management Programs; and is responsible for the development, coordination, implementation, and evaluation of these programs. Assists the states in developing comprehensive air programs, including state implementation plans and transportation control plans. In coordination with the Surveillance and Analysis Division, provides or arranges for technical assistance to state and local agencies in developing and implementing plans, monitoring systems, instrumentation, data collection and analysis systems, and emergency episode response capabilities.

4. Surveillance and Analysis Division - Collects, analyzes, and evaluates environmental quality data in support of regional and national monitoring requirements and for enforcement programs. Directs and coordinates surveillance, pollution source inventory, and monitoring activities within the region, and provides necessary analytical laboratory support services. Directs the operation of subregional laboratory elements. Provides advice and assistance to state and local agencies concerning techniques, methodology, quality control, as well as laboratory support when required, to assure effective monitoring systems. Conducts special studies, investigations, analyses, and surveys to acquire the necessary data to support program offices within EPA. Implements regional monitoring programs to meet regional and national objectives and operates the Regional Environmental Emergency Response Center.

5. Water Divisions - Recommends goals, priorities, and objectives for the Regional Water Programs; and is responsible for the development, coordination, implementation, and evaluation of the programs. Assists the states in developing comprehensive programs, including implementation plans for the achievement of water quality standards. Operates a municipal wastewater systems program, including reviews of facility plans and plans and specifications. Monitors construction program. Conducts grants programs. Coordinates areawide planning and other water quality planning activities. Develops control strategies for non-point source discharges and ocean dumping. Operates a water supply program. In coordination with the Surveillance and Analysis Division, provides or arranges for technical assistance to state and local agencies in developing and implementing these programs.

There were a total of 527 employees in the Region III Office of EPA according to a computerized staff listing of July, 1976. Of this total, 382 were identified as working in one of the seven program areas studied in this report, and the remainder were engaged in other region-wide or supportive activities. Student or summer aides were not taken into account in computing these figures.

A general breakdown of Regional employees by skill level is listed below. Although it includes all employees in the Regional Office, growth projections are based on the average growth rates anticipated in the program areas. These were obtained through a combination of professional judgements by professionals working in each individual program and the latest available Regional Preview documents. These average growth rates were then projected for all employees. It should be noted that a substantial margin of error may exist because of the above method and also because personnel were placed into categories on the basis of job titles and the requirements necessary for these jobs. These may not accurately represent a person's responsibilities or background.

TABLE I
U.S. EPA REGION III
Current (1976) Staffing Level

Position	1976	Anticipated % annum growth to 1982 (avg.)
Administrative	122	7%
Professional	212	16%
Technical	54	17%
Clerical	139	8%
TOTAL	527	

Figure 1

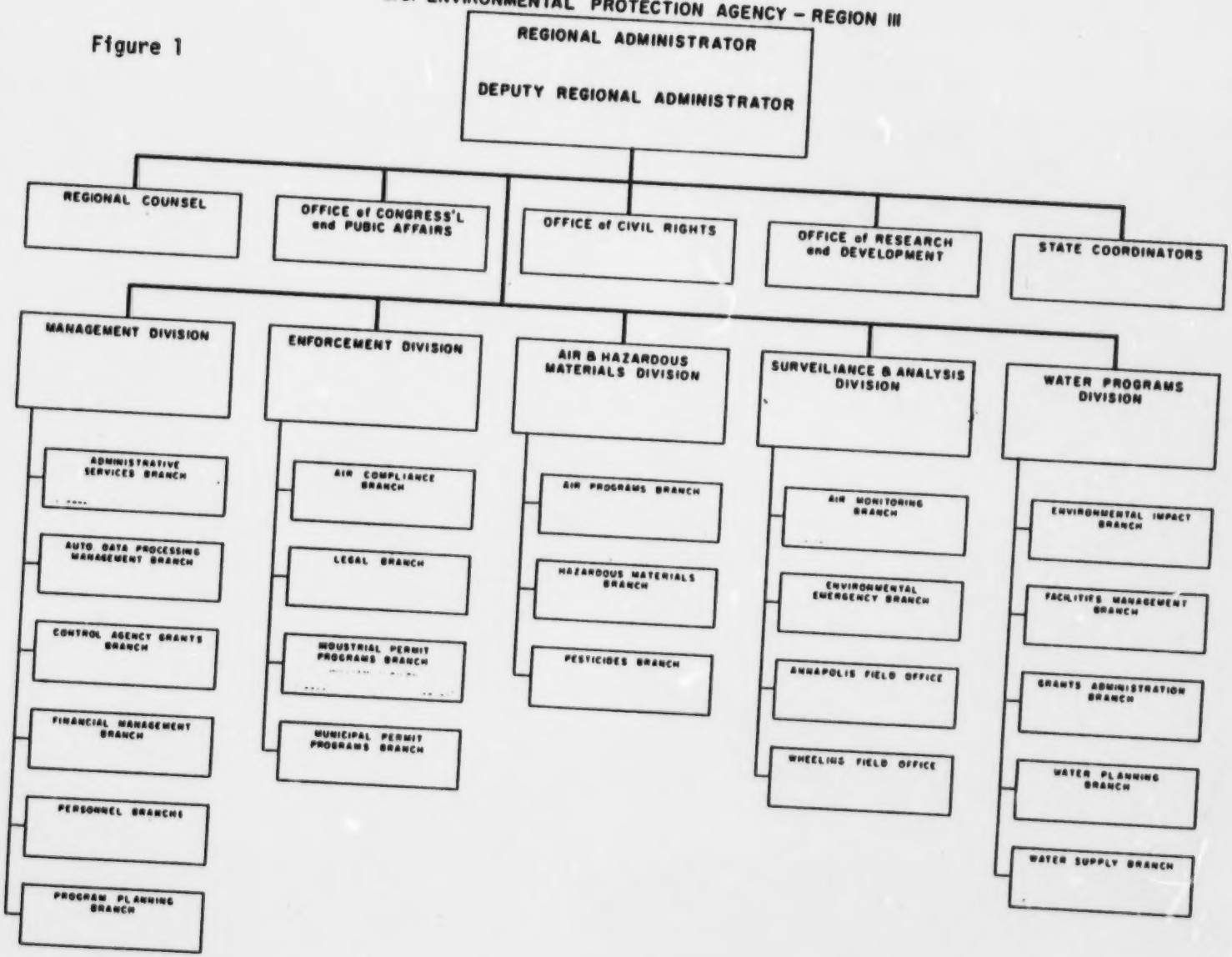
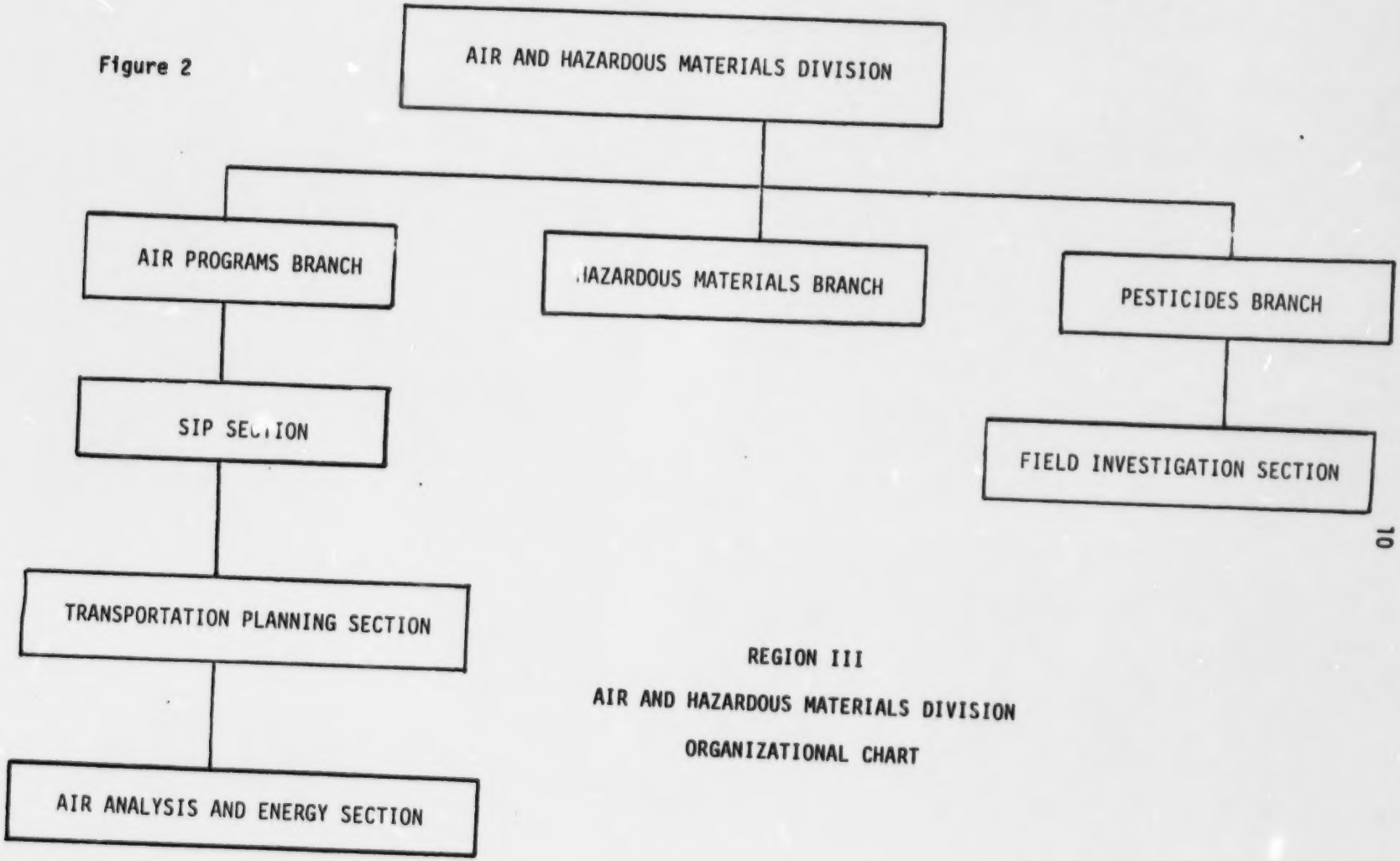

U.S. ENVIRONMENTAL PROTECTION AGENCY – REGION III
REGIONAL ADMINISTRATOR
DEPUTY REGIONAL ADMINISTRATOR
REGIONAL COUNSEL
OFFICE of CONGRESS'L and PUBIC AFFAIRS
OFFICE of CIVIL RIGHTS
OFFICE of RESEARCH and DEVELOPMENT
STATE COORDINATORS
MANAGEMENT DIVISION
ADMINISTRATIVE SERVICES BRANCH
AUTO DATA PROCESSING MANAGEMENT BRANCH
CONTROL AGENCY GRANTS BRANCH
FINANCIAL MANAGEMENT BRANCH
PERSONNEL BRANCH
PROGRAM PLANNING BRANCH
ENFORCEMENT DIVISION
AIR COMPLIANCE BRANCH
LEGAL BRANCH
NOUSTRIAL PERMIT PROGRAMS BRANCH
MUNICIPAL PERMIT PROGRAMS BRANCH
AIR & HAZARDOUS MATERIALS DIVISION
AIR PROGRAMS BRANCH
HAZARDOUS MATERIALS BRANCH
PESTICIDES BRANCH
SURVEILIANCE & ANALYSIS DIVISION
AIR MONITORING BRANCH
ENVIRONMENTAL EMERGENCY BRANCH
ANNAPOLIS FIELD OFFICE
WHEELING FIELD OFFICE
WATER PROGRAMS DIVISION
ENVIRONMENTAL IMPACT BRANCH
FACILITIES MANAGEMENT BRANCH
GRANTS ADMINISTRATION BRANCH
WATER PLANNING BRANCH
WATER SUPPLY BRANCH

Figure 2

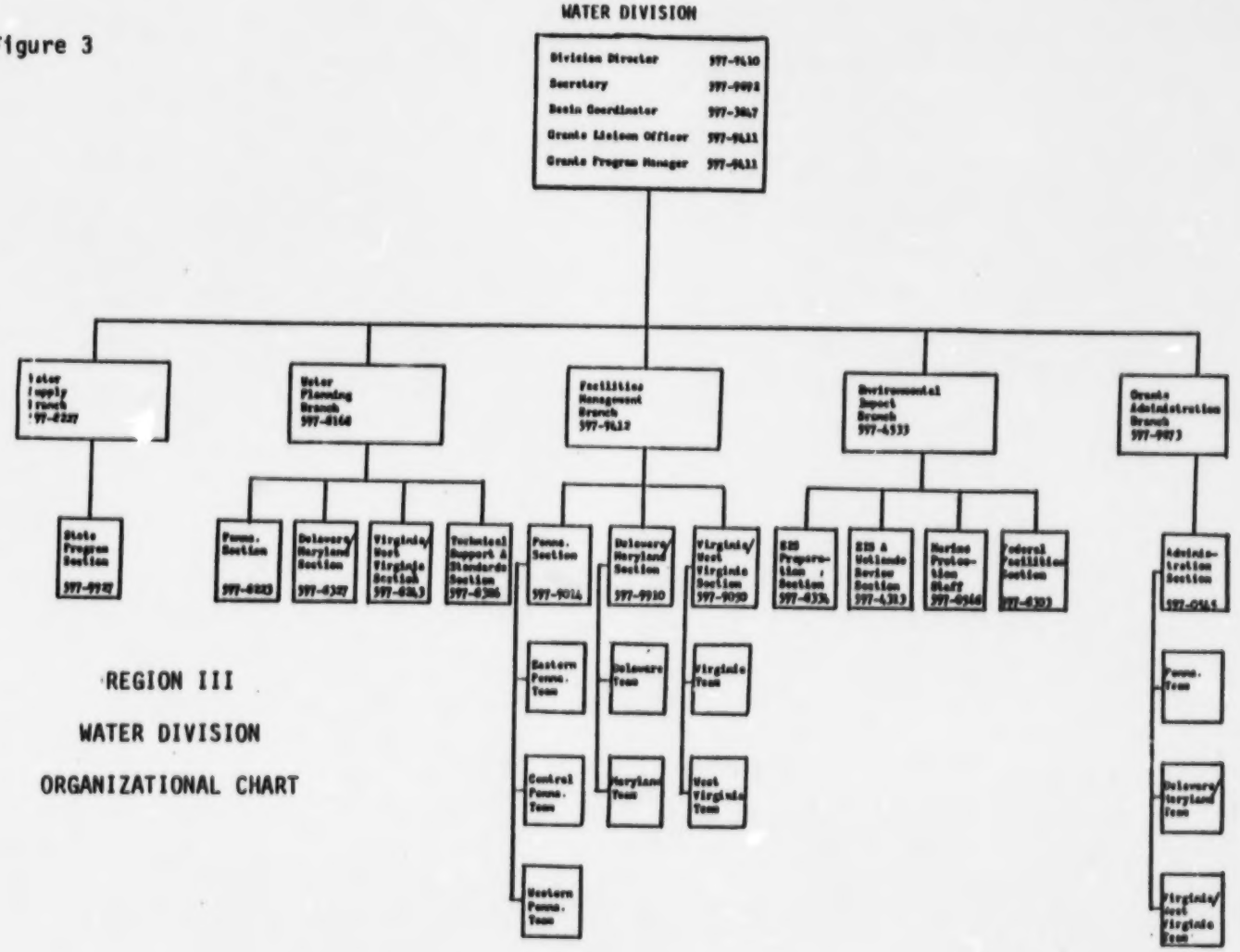


REGION III

AIR AND HAZARDOUS MATERIALS DIVISION

ORGANIZATIONAL CHART

Figure 3

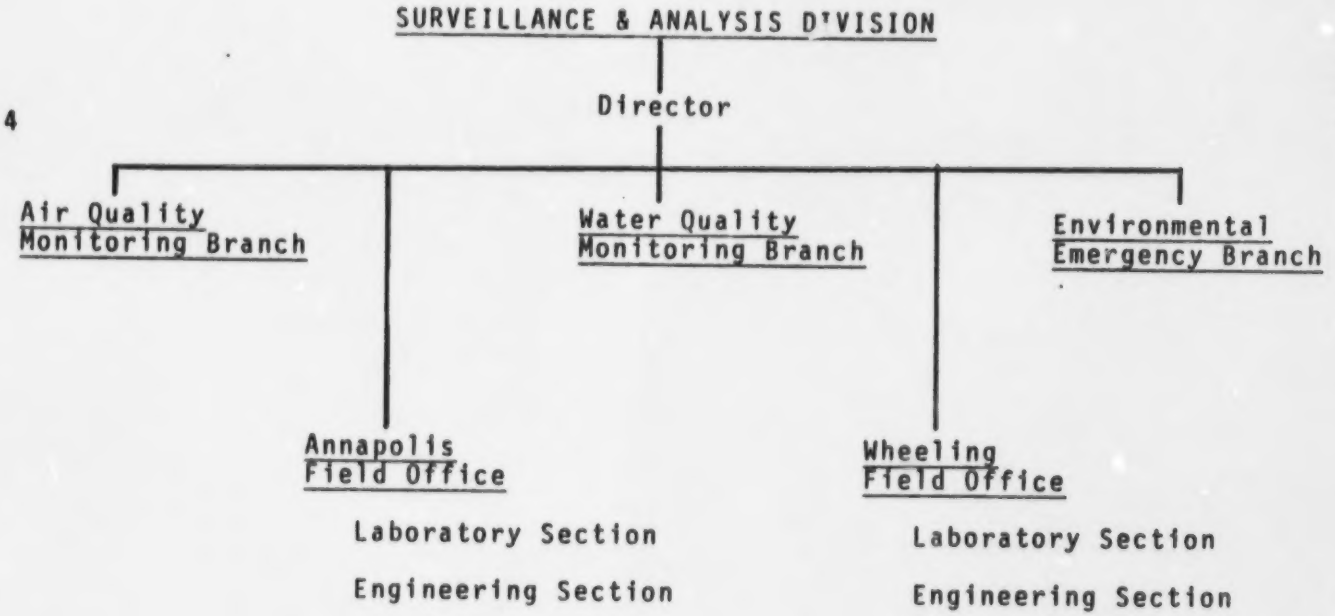


REGION III

WATER DIVISION

ORGANIZATIONAL CHART

Figure 4



REGION III

SURVEILLANCE AND ANALYSIS DIVISION

ORGANIZATIONAL CHART

Regional Pollution Control and Abatement Programs

I. AIR

A. Workforce Profile

The Clean Air Act of 1970 established national air quality standards and gave EPA the statutory authority to curb pollution from both stationary and mobile sources. The Act requires that air quality must meet specific EPA-mandated standards and that once these are attained air quality cannot be degraded. Implementation of the law is achieved through two regulatory programs: national emission standards and air quality management. The national emission standards apply to products such as automobiles, new industrial facilities, and those facilities emitting hazardous air pollutants. Air quality management is attained through State Implementation Plans (SIP) which require each state to prepare a plan for achieving and maintaining air quality standards within its jurisdiction. The air pollution control and abatement program in Region III is responsible for the enforcement of these programs and assistance to state and local governments in meeting air quality standards.

Much of the activity of the regional personnel is directed toward the monitoring of pollutant sources, review and enforcement of state plans, and control of new source pollutants. To oversee these functions, seventy-seven people are currently working in air programs. These persons are located in the Air and Hazardous Materials Division as well as the Surveillance and Analysis and Enforcement Divisions. The personnel can be grouped into four occupational categories as indicated in Table II below. The engineers are environmental engineers and those classified as scientists

are environmental protection specialists. Both of the categories require four-year degrees, the former in engineering and the latter in a physical science or related field. The technical positions require a high school degree and work related experience; however, many of those employed as technicians have had some college training. Most of the positions classified as "other" in Table II provide clerical support to the program.

TABLE II

U.S. EPA REGION III
Current (1976) Air Pollution Control Staffing Level

Position	1976
Engineer	24
Scientist	23
Technician	5
Other	25
TOTAL	77

B. Workforce Projections

Current projections, based primarily on estimates provided by professionals working in the Regional Office, indicate a substantial increase in the number of persons required in the air pollution abatement and control program over the next five years. As indicated in Table III, the total increase should be at a rate of about 11 percent per year, with most of the demand occurring for engineers.

Several program activities in the Region necessitate the need for increased personnel. The majority of the projected increase will be devoted to enforcement activities such as control of mobile source pollutant, prevention of significant deterioration of air quality, and enforcement

standards for hazardous materials. Furthermore, additional personnel will be required for priority abatement and control activities. This includes technical assistance to state and local agencies and private industry in the control of stationary source pollutants, transportation planning activities, the improvement of regional programs in new source review and prevention of significant deterioration, and monitoring and analysis.

Turnover among personnel in the air program has been extremely low over the past few years and this is not anticipated to change. Generally, federal salaries tend to be comparable to or higher than those found elsewhere and this tends to hold down the turnover rate.

TABLE III

U.S. EPA REGION III
Workforce Projections to 1982 for Air Pollution Control

Position	1976	1977	1978	1979	1980	1981	%/annum growth/decline (avg.)
Engineer	24	26	31	37	41	44	13%
Scientist	23	25	30	36	39	41	12%
Technician	5	6	8	10	11	12	19%
Other	25	26	28	31	32	33	6%
TOTAL	77	83	97	114	123	130	11%

C. Training and Certification

Training air program personnel in the region is accomplished through various methods. They include courses offered by the Air Pollution Training Institute, civil service courses, seminars, and professional association courses and workshops. Although no formal on-the-job training program is offered, an informal program exists by which new personnel are trained in agency procedures by their co-workers.

Several formal "short courses" are offered to employees through EPA's Air Pollution Training Institute, which is located at Research Triangle Park, North Carolina. The courses and seminars, which are designed primarily for professionals working in air pollution control, are often offered in the region and help to bring the regional personnel, as well as others, up to date on technical advances in the air programs. Program managers estimate that 80 percent of the professional employees in the air program have participated in this training. In addition, employees are encouraged to take graduate or other college training which will contribute to their professional advancement, and several of these employees in the Region III office are taking advantage of this opportunity.

D. Career Potential

The career potential in air pollution programs in Region III can be expected to show a significant increase over the next few years. The greatest demand will continue to be for those individuals with engineering or scientific backgrounds. While there will continue to be a need for technical people without a college degree, it appears that this will result in few additional jobs and with the possibility that available ones will be filled through the promotion of in-house staff.

As the federal government continues to give increasing responsibility to the states, there will be more career potential at that level. In particular, there will be a significant need for planning, such as transportation control planning by the states, and this could very well be the area where the best job opportunities are located. These positions would probably require a degree in planning or engineering.

E. Conclusion

It appears that opportunities for careers in air pollution control with the federal government in Region III are somewhat limited since most of the regional responsibility lies in the monitoring, review, and enforcement of state programs. Generally, the professional people employed in the field have educational backgrounds in engineering or the physical sciences with little specific training in air pollution. This is not likely to change dramatically in the near future, and there is an abundance of qualified persons in the workforce. With the trend toward limiting the size of the federal government and the shifting of responsibilities to the states, along with budget constraints, the job potential looks brighter in the state and local governments and in private industry.

II. NOISE

A. Workforce Profile

Noise pollution, as an environmental problem, was addressed in the Clean Air Act of 1970 which authorized an Office of Noise Abatement and Control within EPA. The efforts of this office led to further recognition of the environmental noise problem and resulted in the enactment of the Noise Control Act of 1972. This law established EPA as the lead agency in the areas of noise research and control.

EPA's responsibilities under the law include developing and publishing information on noise levels, coordination of all federal noise control programs, setting standards of noise-emission for various products such as electronic equipment, engines, and machinery used in construction and transportation, and requiring the labeling of consumer products as to their noise-generating characteristics or their effectiveness in reducing noise. In addition to EPA, several federal agencies have some jurisdiction over noise pollution. Particularly significant are the Federal Aviation Administration which has the authority to set standards for aircraft noise, and the Department of Labor which, under the Occupational Safety and Health Act of 1970, can set occupational noise standards. Also, the Departments of Transportation, Housing and Urban Development, Defense, Commerce, Interior, Health, Education and Welfare, Treasury, the General Services Administration, and the National Aeronautics and Space Administration have limited responsibilities in noise research or control.

In contrast to most environmental programs, EPA's role with state and local governments in noise control is limited to providing technical assistance. No grant program exists to initiate or support programs at the state or municipal level, so these agencies must find the funds to support any programs they may have. This may account for the relatively small numbers of people working in noise control in the states. Even at the federal level, EPA's activities have been severely limited because of resource constraints.

Much of EPA's activity at the regional level consists of providing assistance to state and local governments through training of personnel, selection and operation of noise abatement equipment, design and preparation of regulations, enforcement, and dissemination of information. Noise control in the Region III EPA Office is in the Hazardous Materials Branch of the Air and Hazardous Materials Division. Currently, there are two people employed full-time on the program; they are environmental engineers and are assisted by the hiring of private consultants when needed. In addition to the noise program, the Hazardous Materials Branch is responsibile for radiation and solid waste programs.

B. Workforce Projections

In Region III, the noise program is expected to grow considerably over the next few years. Much of this growth is attributed to the fact that the present staffing level is inadequate to carry out the commitments of the program. These commitments include the identification of major regional noise sources, technical assistance to state and local governments in developing and enforcing regulations, and assistance to federal facilities in complying with federal regulations. The Regional Office estimates that a minimum of three additional persons would be needed by 1978 to handle these activities. Table IV below projects this staffing estimate for 1978 and only slight growth in the following years. Although the actual number of people will remain small, the increase will average about 45 percent per year. The greatest demand will occur for engineers but there will also be a need for technical persons without a college degree.

TABLE IV

U.S. EPA REGION III
Workforce Projections to 1982 for Noise Control

Position	1976	1977	1978	1979	1980	1981	%/annum growth/ decline (average)
Engineer	1	2	2	3	3	3	30%
Technician	-	-	1	1	1	1	20%
Other	-	-	1	1	1	1	20%
TOTAL	1	2	4	5	5	5	45%

Nationally, EPA hopes to increase its efforts in reducing noise pollution. Emphasis will be placed on the coordination of federal research, improvement of policies and programs for noise research, increased enforcement, product labeling, and demonstration programs. Most of these

are continuations of ongoing activities and will result in only a small increase in the regional workforce.

The one program with far-reaching implications on workforce in the region is that of demonstration programs. EPA plans to implement two new demonstration programs when additional personnel resources become available. They may be started as early as Fiscal Year 1978. The two, the Quiet Communities Program and the Each Community Helps Others (ECHO), would complement each other. Under the Quiet Communities Program, a limited number of demonstration communities would be chosen nationally and a close working relationship established between the EPA Regional Office and these communities in the development of model noise control programs.. Half of the communities would be assisted in the development of comprehensive noise control programs while the other half would be assisted in developing programs in a specific area of noise pollution such as construction site noise or vehicle noise.

The ECHO Program would provide direct person-to-person technical assistance to communities with problems similar to those of the emonstration communities in the Quiet Communities Program. This program would involve sharing experience and personnel to enact strong noise control programs in local governments throughout the country. It is anticipated that these programs will reduce the need for federal grant assistance and they recognize the fact that the federal government does not have the personnel resources to provide direct technical assistance to each community.

If implemented, these programs will require additional trained personnel in the Regional Office as well as in the states and local communities although professionals in the region are unable to accurately predict at this time the numbers of people or levels of training required.

C. Training and Certification

Positions in noise control and abatement normally require a four-year degree as a minimum, usually in engineering or a science such as physics. Normally this has been accomplished through the general programs offered in colleges and universities with minimal training in specific disciplines of noise abatement and control. Since there are only two people in the noise program in the Region III Office, there is no in-house training program. The Regional Office does informally provide training to state and local governments on noise control procedures through individual technical assistance and publications. Formal training is impossible due to the budget and personnel constraints in the region.

D. Career Potential

Career potential in noise control should be greater at the state and local level and in private industry over the next few years than in the federal government. Since EPA's role is limited to providing assistance to states, the number of jobs created at the regional level will remain relatively small. Generally, a four-year degree will be required with some specialized training in noise abatement and control or advanced training desirable. Some technical positions may possibly be created if the resources become available to implement new programs.

E. Conclusion

The mission of EPA in the abatement and control of noise pollution is one of assistance, research and coordination. Most of the functions can be administered centrally, limiting the size of the necessary workforce in the region. The federal government encourages the states and municipalities to take the lead in noise control activities; this will have the effect of shifting the public job potential to those sectors. However, the absence of any granting or funding authority under the Noise Control Act has seriously hampered growth of the program. State and local governments do not have the necessary funding to operate the programs without federal assistance. The real potential in noise control should be in private industry where the ever-increasing numbers of products subject to regulation and the increased emphasis on product labeling will require manufacturers to devote more attention to the noise polluting characteristics of their products.

III. PESTICIDES

A. Workforce Profile

The federal government has been involved in the control and regulation of pesticides for more than sixty years. Although early laws recognized the potential hazards of pesticide misuse, the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of 1947 first gave the federal government substantial authority over the control of pesticides. The Department of Agriculture had the primary responsibility under this law for pesticide regulation until 1970 when responsibility was shifted to EPA. The 1947 law provided for federal registration of pesticides available in interstate commerce. In 1972, FIFRA was amended to give EPA broader authority, including the registration of pesticides in intrastate commerce. The amended law also allows for the classification of pesticide uses and the certification of applicators.

In the regulation of pesticides, the role of EPA can be divided into two objectives: supply control and use control. Supply control includes the initial registration, re-registration and renewal of pesticides meeting the minimum standards set by EPA, the removal of products which do not meet these standards and the enforcement of registration decisions. Use control includes the regulation over the use of hazardous pesticides, establishment of standards for applicator certification, and the authority to review and approve state plans for training and certification of operators.

Although EPA is the primary federal agency responsible for pesticide regulation, other agencies have important responsibilities. The Department of Agriculture advises and assists farmers in the selection of pesticides and other pest control methods; the Food and Drug Administration enforces EPA standards for pesticide residue on food and feed crops; and the Occupational Safety and Health Administration works with EPA to protect farmworkers from adverse effects of pesticide use.

Because of the widespread use of pesticides in American agriculture, the workforce in this area is the largest of the environmental programs. In Region III, Pennsylvania and Virginia have the greatest amount of cropland and tens of thousands of farmers are pesticide applicators, many of whom will have to be certified under the law. Thousands of additional workers in the region are employed as commercial applicators such as exterminators. Compared with the private sector, public employment in pesticide programs is relatively small. Within EPA there are fewer than one thousand persons nationally working on pesticides and most of them are located in Washington, D.C. Only about one out of every five jobs is located in the Regional Office.

In the Region III office there are 16 persons working in pesticides, as indicated in Table V below. These persons are located primarily in the Pesticides Branch of the Air and Hazardous Materials Division, but there are also personnel located in the Enforcement Division. The professional employees are degreed individuals with educational backgrounds in the physical sciences. In Table V, the Scientist category includes consumer protection specialists, environmental protection specialists, an ecologist, and an entomologist, while the "Other" category contains administrative and clerical personnel, such as registration clerks. Requirements for

consumer and environmental protection specialists are a four-year degree in the physical or agricultural sciences. The mission of the Regional Office consists of providing assistance to the states in developing programs for applicator training and certification, inspections, and enforcement of regulations. The office is not involved to a great extent in registration since this program is centralized with most of the activity in the headquarters office in Washington.

TABLE V

U.S. EPA REGION III
Current (1976) Pesticide Workforce Staffing Levels

Position	1976
Scientist	
Consumer Safety Officer	5
Environmental Protection Specialist	4
Ecologist	1
Entomologist	1
Attorney	1
Other	4
TOTAL	16

B. Workforce Projections

Several factors point toward substantial growth in the pesticides program during the next few years. As the review of state plans for applicator training and certification are completed, increasing emphasis will be placed on enforcement and inspection activities. Although the states are expected to increase their own enforcement activities, the Region III Office will have to provide them with the technical assistance necessary to ensure the effective enforcement of FIFRA. This translates

into more trained personnel, primarily scientists, in the Regional Office to supplement state activities. Other priorities in Region III will be the inspection of the use and production of restricted use pesticides, investigation of alleged pesticide misuse, and dissemination of information on re-registration of pesticides and registration of new pesticide products. These activities will require additional personnel, with the expectation that professionals with scientific training will be hired to carry out these activities.

Other programs which are expected to affect the growth in pesticides are the Toxic Substances Control Act and Integrated Pest Management. Congress recently enacted the Toxic Substances law and it is still uncertain what the role of the pesticides program will be in the administration of it. In the region it would probably require increased enforcement personnel. However, no accurate projections concerning proposed staffing levels are currently available.

Integrated Pest Management (IPM) is emerging as the major form of pest control in the United States. It encourages the maximum use of natural controls of pests such as cultural methods, pest diseases, sterile insects, resistant crop varieties and pest predators. This program will require careful monitoring of pest control methods and the knowledge of which technique or combination of techniques is most effective. A 1972 study by the Department of Agriculture estimated that if fully utilized in Region III, IPM had the potential for employing over 5,100 people in the states within the region. These people would be trained as crop protection specialists and field scouts. Before this kind of growth can occur, IPM must gain a greater degree of acceptance, particularly among

farmers. Economic benefits of IPM must be demonstrated to them to reduce their fears of crop loss.

The growth in pesticides is estimated by the professionals currently working in the program to occur at a rate of approximately ten percent per year. This increase will be primarily in professional positions, with some potential openings for technicians in inspection activities and slight growth in clerical and administrative jobs. This is indicated in Table VI below.

TABLE VI

U.S. EPA REGION III

Workforce Projections to 1982 for Pesticides

Position	1976	1977	1978	1979	1980	1981	%/annum growth/ decline (average)
Scientist	11	13	14	15	16	17	9%
Technician				1	1	2	N/A
Other	5	5	6	6	7	7	8%
TOTAL	16	18	20	22	24	26	10%

With the enactment of FIFRA, the responsibility for the training and certification of pesticide applicators was placed upon the states. Following the approval of all state plans by October, 1977, the emphasis will be on re-certification and upgrade training. Again, these will be the responsibility of the states. The federal role will be that of providing assistance to the states through financial, personnel and technical resources. EPA currently provides training in several pesticide subjects such as the safe use of pesticide products,

environmental problems associated with pesticides, and pesticide poisoning. These courses are available to federal, state, and local personnel working in pesticides as well as those in private industry.

Although no formal training program exists for new employees, informal on-the-job training is provided for personnel of the pesticides branch of the Region III Office. The purpose of this training is to familiarize new personnel with office procedures and the federal pesticide regulations. Professionals in the region feel that a more formal, intensive training program is needed for field inspection personnel.

The greatest potential for training in the pesticide program would appear to be in Integrated Pest Management. The federal government has initiated programs to promote the development and use of IPM including those to promote training of professional pest managers. The speed with which IPM will be implemented throughout the country remains dependent, however, on the acceptance of it by the states, private industry, and the individual farmers.

D. Career Potential

Opportunities look good over the next several years for careers in pest management. Several of these jobs will continue to require a college degree in one of the physical sciences. However, there should be significant potential for those with technical training, especially in the inspection programs. The increased usage of IPM could create a demand for thousands of additional, specifically trained persons. As previously mentioned in Section B, a Department of Agriculture

study done in 1972 indicated the potential workforce requirements for IPM to be more than 5,100 persons in Region III. This figure includes over 2,350 in Pennsylvania, 240 in Delaware, 760 in Maryland, 1,400 in Virginia, and 400 in West Virginia. Most of the demand in IPM would be for persons trained as field scouts, requiring a high school education with some knowledge of entomology. These scouts would be trained to identify and measure detrimental and beneficial insect levels. There would also be some demand for professional crop protection specialists with strong backgrounds in the physical sciences and an understanding of the economic and environmental impacts of pest control. The Agriculture Department based its figures on one field scout per 2,000 acres of cropland and one crop protection specialist per 30,000 acres.

If EPA is successful in transferring most of the responsibility for pest control to the states, the potential for jobs will be in state government and private industry. Opportunities at the federal level can be expected to stabilize once the initial registration and approval of state programs have been completed. Most of the federal activity will be in enforcement and inspection.

E. Conclusion

EPA's responsibilities in pest control consist of the registration of pesticide products, regulating use of hazardous pesticides, establishment of standards for applicator certification, review and approval of state plans for training and certification, and enforcement.

Most of these activities are controlled through EPA headquarters in Washington with the regional offices being responsible principally in the areas of enforcement and review of state plans.

Pest management is a growing program because of the increasing number of products in use and the emergence of new approaches such as IPM. While the federal government will continue to set standards for pesticide products and their use and enforce these standards, the states are being encouraged to assume increased responsibility in assuring the proper use of pesticides and the development of comprehensive pest management programs.

IV. POTABLE WATER

A. Workforce Profile

The mission of the water supply (potable water) program is to ensure that all public water supplies provide safe and sanitary drinking water to all citizens. The federal government instituted a program to improve the quality of drinking water with the passage of the Safe Drinking Water Act (SDWA) in 1974. EPA's responsibilities under the act include the establishment and enforcement of National Primary Drinking Water Regulations, assistance to the states through federal grants, and the establishment of a program to protect underground sources of drinking water. Each public water supply is required to monitor, test and otherwise operate in compliance with the regulations. States are encouraged to assume maximum responsibility for the implementation and enforcement of the regulations. The water supply program and SDWA are aided in these efforts by the Federal Water Pollution Control Act which sets water quality standards and controls the release of pollutants into the water systems.

The Water Supply Branch in Region III is located within the Water Division and is concerned with working with states and the water supply facilities in carrying out the provisions of SDWA. This is done through technical assistance, financial assistance, training of state and local personnel, and review of environmental impact statements. EPA has delegated the authority to the regional office for state assistance and granting state primacy under SDWA.

Since current activity is directed toward helping the states assume primacy, the Water Supply Branch has a small in-house staff. Of the thirteen people working in the Branch, eight are engineers, one is an environmental protection specialist, two are technicians, and two are clerical. The engineers are primarily sanitary engineers and the technicians have work experience in engineering and physical science.

TABLE VII

U.S. EPA REGION III
Current (1976) Potable Water Staffing Level

Position	1976
Engineer	8
Scientist	1
Technician	2
Other	2
TOTAL	13

B. Workforce Projections

Professional estimates indicate that the workforce in water supply in Region III will increase at a rate of about twenty percent per year over the next five years. This increase will occur during the next two years in the implementation of the Safe Drinking Water Act and then will level off with no additional increase forecasted. This is depicted in Table VIII. It is anticipated that the types of jobs and the training required will not be different from current requirements.

Table VIII

U.S. EPA REGION III
Workforce Projections to 1982 for Potable Water

Position	1976	1977	1978	1979	1980	1981	% annum growth/decline (avg.)
Engineer	8	13	18	18	18	18	20%
Scientist	1	3	5	5	5	5	53%
Technician	2	3	4	4	4	4	17%
Other	2	2	3	3	3	3	10%
TOTAL	13	21	30	30	30	30	21%

It should be noted that the projections in Table VIII include personnel in the Regional Office to implement the water supply program in Pennsylvania since that state has rejected primacy under SDWA for Fiscal Years 1976 and 1977. Program professionals estimate that an additional six people will be required in 1977 for this activity alone. The remainder of the increase is necessary for the operation of the water system surveillance and Underground Injection Control programs (UIC).

It is further anticipated by the program managers that Pennsylvania will continue to reject primacy beyond FY 77 and this will require increased personnel resources for 1978 and thereafter. Most of the nine additional positions in 1978 will be utilized in the enforcement, surveillance, data management, granting of variances and exeptions, and the UIC program in Pennsylvania. The remainder will be concerned with the UIC program in the other states in the Region.

It is assumed at the present time that the other states in Region III will assume primacy under SDWA and, therefore, the staffing level should remain stable after 1978. However, several factors are affecting state decisions on this question. The financial constraints seem to be the largest factor. States are required to have the resources for implementation

and enforcement of the program before primacy can be granted. Other factors include the lack of trained personnel and the disagreement with or misunderstanding of the program. The decisions of these states may depend on the amount of federal funding available to them once primacy is assumed.

The other activity which will impact the regional program staffing level is Underground Injection Control (UIC). SDWA mandates a separate program to prevent the contamination of underground sources of drinking water from uncontrolled injection of fluids. The law provides for the same kind of program in UIC that it required for public water supplies, including the intent of state assumption of primacy. Since EPA has only recently proposed regulations for UIC, the program is just now getting underway with the bulk of the activity to be located at the regional level. Additional personnel will be necessary for this program in the future if state primacy is not assumed as anticipated in Pennsylvania. Figures are not available to indicate how many positions may be required if other states do not accept primacy but it would increase staffing needs for 1979 and beyond.

C. Training and Certification

Because of the relatively small number of personnel in the water supply program in Region III, no formal training is done by the Regional Office. New persons in the program are given informal on-the-job training through working relationships with others in the program. Personnel are also encouraged to take advantage of job related courses or advancement training offered by local colleges and universities.

The Office of Water Supply at EPA Headquarters in Washington has developed a comprehensive program of training activities designed to support the implementation of SDWA. The program utilizes a three phase approach: Phase I provides the Regions, States, and operators with the skills and knowledge required to carry out their responsibilities under SDWA, Phase II is directed toward technical assistance and program requirements of states and water supplies, and Phase III addresses the long range support of the program. Some of the Phase I courses being developed that will have an impact on Region III are described in Table IX below.

Several methods will be employed in the operation of these courses including programmed instruction, seminars, workshops, demonstrations and audio visual instruction. It is expected that the training programs will be implemented by the states under their assumption of primacy for SDWA. The Regional Office will have the responsibility to provide assistance and support to the states and to monitor operation and performance. The Office of Water Supply in Washington will provide the materials and resources to the Regional Office and will train the Regional staff to conduct further training. It is hoped that through this type of program, training can be provided to all persons involved in water supply including federal, state, and local personnel and water supply facility owners and operators.

TABLE IX

TRAINING PACKAGES CURRENTLY BEING DEVELOPED BY THE OFFICE OF WATER SUPPLY, UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, UNDER PHASE I OF ITS NATIONAL TRAINING STRATEGY WHICH WILL IMPACT REGION III

1) Safe Drinking Water Act (1974) implementation workshops and materials for local operators and officials.

   - available March, 1977

2) A basic operator training course for entry-level water supply personnel designed for delivery by state educational institutions agencies.

   - available Summer, 1977

3) Laboratory certification courses for regional and state personnel involved in certifying chemical and bacteriological laboratories.

   - available early 1977

4) Laboratory methodology courses in approved testing methods for regional, state, and local laboratory technicians.

   - available summer and fall, 1977

5) Sanitary survey courses in the methodology involved in surveying small water supply systems as well as more complex systems.

   - available October, 1977

6) Public Notification short course for local suppliers to aid in handling public notification procedures.

   - available Summer, 1977

7) Variances and exemptions course for state personnel to determine procedures involved in such instances under SDWA (1974).

   - available summer, 1977

8) State training program management course for regional and state agency personnel in training planning.

   - available Spring, 1977

Reference: Office of Water Supply
Training Strategy
October 21, 1976

D. Career Potential

The outlook for a significant increase in the number of jobs in the water supply program in Region III appears likely at the present time. The primary reason for this is the decision by Pennsylvania not to assume primacy under SDWA. Most of the demand at the federal level will be for personnel trained in engineering or the physical sciences, with some opportunity available for technicians. In addition, a need for trained and experienced personnel will develop at the state level, as well as in private water supply facilities since they must also comply with the provisions of SDWA. A major role of the federal government will be that of providing the training for these individuals.

E. Conclusion

The water supply program in Region III is directed toward the implementation of the Safe Drinking Water Act. The Regional Office provides assistance, both technical and financial, to the states to help them gradually assume full responsibility for administration of the program. It also is charged with administering the program for any state that chooses to reject primacy, which is the case with Pennsylvania.

The Pennsylvania decision will necessitate a significant increase in the regional program staff. It is estimated, however, that the other states will assume more and more responsibility for the program and the level of staffing the Regional Office will remain stable after the initial increase. Much of the employment opportunity in water supply will occur at the state level and in private water supply facilities.

V. RADIATION

A. Workforce Profile

EPA has the responsibility for coordination of a federal program to control radiation. The objective of the program is to balance the adverse effects of radiation exposure with the benefits to be derived from it. EPA's responsibilities are not limited to the environmental aspects of radiation but include medical X-ray and occupational uses of radiation as well. The program covers both ionizing radiation such as that produced from nuclear power plants, medical X-rays, and naturally-occurring sources like mining, and non-ionizing radiation emitted from radio and television transmitters, radar, and microwaves.

Responsibility for radiation control is shared by EPA with several other federal agencies including the Nuclear Regulatory Commission, the Energy Research and Development Administration and the Department of Health, Education and Welfare. EPA's authority in radiation is derived from several federal laws, including the Federal Water Pollution Control Act Amendments, the Safe Drinking Water Act, the Clean Air Act, the Marine Protection, Research and Sanctuaries Act, and the Atomic Energy Act. Most of the authorities lie in issuing standards and providing technical assistance. Enforcement responsibility is limited to drinking water standards, ocean dumping, and discharge permits for release of natural occurring radioactive materials into navigable waters.

In the control of radiation from nuclear power plants, the Region has three main functions. The first is the non-specific monitoring of

releases at power plants in the Region through the Environmental Radiation Ambient Monitoring System (ERAMS). The second function is the review of Environmental Impact Statements (EIS) for power plants and the third is the assistance provided to the states to minimize the consequences of a nuclear accident. There are currently eight nuclear plants operating in Region III with twenty more in the construction or planning stages. The enforcement program is carried out by personnel in the Water Quality and Water Supply programs since EPA's only enforcement authority in radiation is with these programs.

The radiation program in the Region III Office is administered through the hazardous materials branch of the Air and Hazardous Materials Division. One person, with a scientific background, a health physicist works in the program.

B. Workforce Projections

Growth in the Radiation Program will occur principally in three areas, nuclear power, radioactive waste disposal, and control of radiation from naturally-occurring sources. Nuclear power and radioactive waste disposal go hand-in-hand since the growth of this industry is expected to account for the vast majority of future radioactive wastes produced. Although no regulatory program exists at present to control naturally-occurring radiation, EPA's objective is to establish standards for the control of this source of exposure in the immediate future. This is the largest single source of population exposure to radiation and the only source that has not received extensive study.

In Region III, nuclear power will have a significant impact in the near future. Eight nuclear plants are licensed and operating within the region, construction permits have been issued for fourteen more, and six additional plants are under review for permits. If all these plants are built, it would almost quadruple the present number of facilities in the next ten years. This increase in number of plants will create an increased burden in the Regional Office in EIS review.

Other regional priorities include the performance of evaluation reviews of federal facilities, and assistance to the states in implementing EPA radiation standards and developing radiological emergency response plans. To adequately carry out these responsibilities, the Regional Office estimates that the program would have to expand over the next five years. There will continue to be a need for persons with strong scientific backgrounds. A need also exists for secretarial assistance to the professionals in the program. The estimated growth is indicated in Table X.

Table X

U.S. EPA REGION III
Workforce Projections to 1982 for Radiation

Position	1976	1977	1978	1979	1980	1981	% annum growth/decline avg.)
Scientist	1	1	3	3	4	4	N/A
Other			1	1	1	1	N/A
TOTAL	1	1	4	4	5	5	N/A

C. Training and Certification

Due to the fact that there is only one person in the Region III Office working in radiation, no training programs, formal or informal, are offered. EPA's Office of Radiation Programs offers one course for professionals. This is an interagency course on emergency response planning conducted at the Defense Civil Preparedness Agency Staff College in Battle Creek, Michigan, and coordinated by the Nuclear Regulatory Commission (NRC). In addition to this course, EPA and NRC offer a variety of films and self-instructional materials to state and local governments on the transportation of radioactive materials.

The bulk of the training programs in radiation are conducted by the NRC. Direct training and assistance is provided by NRC to the states through its Agreement States Program whereby a state can assume regulatory authority over nuclear materials in quantities not sufficient to form a critical mass. Before granting this authority, NRC must determine that the state's radiation program is adequate to protect public health and safety and compatible with NRC's program. Once a state is given agreement status, NRC conducts extensive training for state personnel to assure that the program is kept up to date in current technology on radiation control. In Region III, only Maryland is an agreement state. NRC also provides training to state agencies that assist NRC in the long-term sampling to evaluate licensee's overall environmental programs. Currently Maryland, Virginia, and Pennsylvania are participating in this program.

D. Career Potential

Although the radiation program in the Region III EPA office is expected to more than double in terms of workforce, only four positions will be created. Because of the small number of people involved, future demand will tend to be for the same types of individuals that are currently employed. Backgrounds in the physical sciences will continue to be in demand and the office expects to get a secretarial position to alleviate the need for sharing secretarial help with other programs in the branch.

The potential for careers in radiation will depend at least partially on the future of nuclear power facilities. At the current rate of increase, these power plants can be expected to provide a large number of jobs for nuclear engineers, scientists and technicians. The development of nuclear power will also affect the number of jobs available in radioactive waste disposal since much of this waste in the future will be generated by nuclear facilities. Most of these jobs will be created in private industry. The potential also exists for the creation of jobs in the mining industries, following the establishment of standards for the control of naturally-occurring radiation.

E. Conclusion

EPA's responsibility in radiation control is the coordination of federal programs for the protection of health and environment. Much of this responsibility is carried out by establishing standards and guidelines, recording and reporting of data, providing technical assistance to the states, and review of environmental impact statements. Most of the enforcement activities are administered through other federal agencies such as NRC, although EPA does have enforcement authority in the areas of drinking water, ocean dumping and discharges into waterways.

In Region III, the potential quadrupling of nuclear power facilities in the next ten years could substantially increase the workload of the regional office. This, plus the development of radioactive waste disposal standards and plans and the development of standards of X-ray exposure, is estimated to more than double the current workforce level. Future careers will tend to be limited to persons with professional training and the bulk of the projected jobs will be with private industry.

VI. SOLID WASTE

A. Workforce Profile

Although federal recognition of solid waste as an environmental problem began in 1965 with the enactment of the Solid Waste Disposal Act, a strong program to encourage solid waste management is just beginning. Comprehensive federal programs in air and water pollution control have had the effects of closing down incinerators and land disposal sites while creating an increased amount of sludge and other pollution treatment residues. The original act was amended first in 1970 by the Resource Recovery Act and most recently by the Resource Conservation and Recovery Act of 1976.

This new law requires states and regional waste management agencies to develop solid waste management plans since this is a program which is best managed at the state and local level. This law also requires that standards be developed for the control of hazardous wastes and that permits be issued to owners and operators of facilities for the treatment or storage of hazardous wastes. Other provisions include programs of research and development, demonstration projects in solid waste technology, and financial assistance to states for the establishment and implementation of solid waste and hazardous waste management plans.

EPA is currently approaching solid waste management from three distinct directions: elimination of the adverse health and environmental effects of improper waste disposal on land, promotion of the recovery of energy and materials from wastes, and waste reduction. The elimination

of adverse effects is chiefly a regulatory function and the Resource Conservation and Recovery Act provides the necessary regulatory authority to the states as well as eliminating a major cause of these adverse effects, open dumps. One of the principal functions of the Region III Office is providing technical assistance to the states in the control of waste disposal. A 1976 survey by Solid Waste Systems magazine indicates there are approximately 350 sanitary landfills in the states of Delaware, Maryland, Virginia, and West Virginia. No figures were reported for D.C. or Pennsylvania.

Resource recovery is a program receiving increasing emphasis within the Region. EPA has supported resource recovery mainly through grants to state and local agencies for the planning and implementation of demonstration projects. Region III currently has four resource recovery projects in the planning or construction phases, and three in operation. These projects appear to be feasible in the region because it contains several large urban areas which produce the quantities of waste required to allow them to operate economically. Two of the projects in the Region, one in Baltimore, Maryland, and the other in Delaware, are funded by EPA as Resource Recovery Demonstration Projects. They serve as a testing ground to identify problems encountered in new resource recovery technology. This program is not without its problems, however. The primary one is that of finding readily available markets for recoverable materials. In addition to resource recovery projects, EPA has sponsored programs to encourage materials separation and separate collection of wastes to promote recycling.

In waste reduction, EPA's efforts have concentrated on two areas, returnable beverage containers and voluntary waste reduction. EPA has issued guidelines establishing mandatory deposits on beverage containers sold at federal facilities. Even though some states have enacted mandatory deposit laws, no state in Region III has done so as yet. Voluntary waste reduction is handled by research leading to the incentive for production and use of reusable products as opposed to disposable products.

The Solid Waste Program is Region III is located in the Hazardous Materials Branch of the Air and Hazardous Materials Division and employs four people. As indicated in Table XI, there are a branch chief, one engineer, a scientist who is an environmental protection specialist, and one secretary. The secretary also handles the clerical work of the noise and radiation programs. One engineering position is vacant. Most of the activity of the branch is concerned with assistance to the states in the form of technical assistance and planning grants. They also work closely with federal facilities in the Region in the promotion of recycling and the elimination of unnecessary wastes.

TABLE XI

U.S. EPA REGION III

Current (1976) Solid Waste Staffing Level

Position	1976
Engineer	1
Scientist	1
Other	2
TOTAL	4

B. Workforce Projections

Workforce in Solid Waste in the Regional Office is expected to expand in the next three years according to the professionals currently working in the program. The major reason for this increase is the passage of the Resource Conservation and Recovery Act. To carry out the provisions of this law, the Regional Office must assist the states in the development and implementation of state and regional waste management plans, enforce standards for disposal of hazardous wastes and ensure that open dumps are phased out by 1983. The program managers have requested two additional people for FY 1978 and 10 additional by 1979 as a result of the new law. The present vacancy is expected to be filled in 1977.

It is anticipated that the personnel hired for these positions will be engineers and scientists. Their function will be to bring the state programs into compliance with federal requirements.

Another program which may impact growth in the Solid Waste program is the implementation of the Toxic Substances Control Act. Since final determinations have not been made as to how the Act will be administered, no projections are available on the number of people required in the Solid Waste Branch over the next five years.

TABLE XII

U.S. EPA REGION III
Workforce Projections to 1982 for Solid Waste

Position	1976	1977	1978	1979	1980	1981	% annum growth/decline (avg.)
Engineer	1	3	4	6	6	6	57%
Scientist	1	2	3	5	5	5	43%
Other	2	2	2	4	4	4	30%
TOTAL	4	7	10	15	15	15	34%

C. Training and Certification

There are no formal training programs in solid waste conducted by the Regional Office. Training requirements are met through individual on-the-job training and participation of personnel in programs available through local universities. Because of the small number of persons currently working in the office, this training is estimated to be adequate at present. With additional personnel being hired as a result of the Resource Conservation and Recovery Act, the needs for formal training programs can be expected to increase. Although no formal training program now exists, the Solid Waste Branch hopes that such a program can be instituted by 1979 when the personnel level is expected to increase significantly.

D. Career Potential

It is unlikely that any new careers in solid waste management will emerge in the immediate future. The potential for jobs is, however, moving in the direction where careers will be more technical and require more education and specialized training. Open dumps and incinerators will be virtually nonexistant in a few years, replaced by modern

facilities such as resource recovery and recycling plants and santitary landfills. The operation of such facilities will require an increasing number of engineers, scientists, and technicians, trained in resource recovery and waste management, and operating personnel for the landfills.

Because the federal government has recognized the responsibility of state and local governments for waste management, those units of government will have a greater job creation potential than the federal government. The private sector, which will produce and operate most of the resource recovery and recycling plants, will also be a large source of future employment in waste management. When the states have implemented their waste management plans, EPA's regional activity will be limited to monitoring and enforcement, limiting job potential in the Regional Office.

E. Conclusion

The current solid waste program in Region III is limited to assisting the states through technical help and planning grants. While only four people are now employed in the program, the recent enactment of the Resource Conservation and Recovery Act is expected to have considerable impact on employment, bringing the total to fifteen by 1982. This will create an increased demand for professionals, such as chemical engineers and scientists.

With the elimination of open dumps and incinerators, waste management technology is moving toward new techniques such as resource recovery and recycling. These areas will provide the future career potential, with the job requirements becoming more specialized and technical.

State and local governments will continue to require increasing numbers of personnel in waste collection and disposal while growing job potential will be found in private industry in the development and operation of resource recovery facilities and the operation of sanitary landfills.

VII. WASTEWATER

A. Workforce Profile

Most of the pollution in waters of the United States is generated by industry, communities, or non-point sources. To control this pollution, the federal government enacted the Federal Water Pollution Control Act in 1956. The basic premise of the law was the establishment of a construction grant program to finance wastewater treatment projects. This law was amended in 1966 and again in 1972 and constitutes the basis of the present federal program in water pollution control.

The Federal Water Pollution Control Act Amendments (FWPCA) have as their goal the attainment of a level of water quality in the United States by 1983 that will protect aquatic life and be clean enough for swimming and other recreational use. The amendments propose to achieve this goal through a two-phase approach. The first phase, to be completed by July 1, 1977, requires that industry use the best practicable technology to control pollution, and that public treatment plants provide at least secondary treatment. By the completion of the second phase on July 1, 1983, industry must use the best available technology and public facilities must provide the best practicable technology for water pollution control.

FWPCA is administered by EPA and the states through two programs provided by the Act, the award of construction grants and the issuance of discharge permits. Construction grant applications and

environmental impact statements for wastewater treatment facilities are reviewed in the EPA Regional Office before the grant is given. After the award is made, the Regional Office monitors and inspects the construction. The National Pollutant Discharge Elimination System (NPDES), the permit program, was established by the law to regulate the amount of pollutants discharged into the waters. EPA has the responsibility to set standards for the effluent limitations or the maximum amount of pollutant that can be discharged into a body of water. While the sources of this pollution such as municipal waste treatment plants and manufacturing plants must monitor and report on the waste discharged, EPA has the authority for the issuance and enforcement of the permits. These activities are generally carried out by the Regional Office.

Since the operation and maintenance of wastewater treatment facilities are local responsibilities, EPA has encouraged the states to become involved in both the review of construction grants and the administration of the NPDES program. In Region III these responsibilities have not been delegated to Pennsylvania or West Virginia and projected staffing needs in this report are based on the regional office assumption that these states will not assume delegation. The Regional Office must administer the programs where they have not been delegated to the states.

In addition to federal, state, and local activities, section 208 of FWPCA provides for the establishment of Areawide Waste Management Planning Agencies (208 agencies) to deal with serious water pollution problems in densely populated or highly industrialized areas. These agencies are concerned with the overall water quality in a specific area which may cover several municipalities and more than one state.

EPA's wastewater program also has responsibility for partial administration of the Marine Protection, Research and Sanctuaries Act of 1972. This act, which establishes a permit program for ocean dumping and bans the dumping of radiological, chemical and biological warfare agents in the oceans, is also administered by the Commerce Department, Army Corps of Engineers, and the Coast Guard. The law is significant to Region III's wastewater program since three of the states within the region border the ocean.

To administer the wastewater program in Region III, EPA employs 268 persons. As Table XIII indicates, 84 are engineers with degrees in sanitary, environmental, civil or chemical engineering. Sanitary engineers are the most prevalent and comprise more than half of the engineers in the program. 77 scientists are employed in the wastewater program, including 38 environmental protection specialists, 14 physical scientists, 10 chemists, 9 biologists, 4 ecologists, 1 geologist and 1 oceanographer. All these positions require four year degrees in the individual discipline although in many cases the job specification merely requires a degree in one of the physical sciences which allows flexibility in hiring from varied educational backgrounds, e.g., a biologist could be hired as an environmentalist or physical scientist. The technician and lab technician positions do not require a college degree but the individuals filling these positions have extensive work experience or a combination of experience and some college work. The wastewater program also utilizes 69 persons classified as "other" in Table XIII which include clerical and administrative personnel in program support functions. In addition to

the Water Division, program personnel in the Regional Office are located in the Enforcement and Surveillance and Analysis Divisions.

TABLE XIII

U.S. EPA REGION III
Current (1976) Wastewater Staffing Level

Position	1976
Engineer	
Sanitary Engineer	46
Environmental Engineer	32
Chemical Engineer	4
Civil Engineer	2
Scientist	
Environmental Protection Specialist	38
Physical Scientist	14
Chemist	10
Biologist	9
Ecologist	4
Geologist	1
Oceanographer	1
Lab Technician	7
Techncian	25
Planner	6
Other	69
TOTAL	268

B. Workforce Projections

According to estimates provided by program professionals, the number of personnel in the wastewater program in Region III is expected to increase at a rate of about 10% per year over the next five years. The increase is expected to occur across the board in all occupational

categories. The need will continue for persons with engineering and scientific backgrounds and opportunities for technicians will be good. A good upward mobility program exists for the advancement of persons into technical positions. Most of the educational and training requirements will remain the same although it has been suggested by professionals in the region that increased emphasis should be placed on management training in the schools.

TABLE XIV

U.S. EPA REGION III
Workforce Projections to 1982 for Wastewater

Position	1976	1977	1978	1979	1980	1981	%/annum growth/decline (avg.)
Engineer	84	92	101	111	123	135	10%
Scientist	77	84	93	103	113	124	10%
Lab Technician	7	8	9	10	11	12	10%
Technician	25	28	31	34	37	41	10%
Other	75	83	91	100	110	121	10%
TOTAL	268	295	325	358	394	433	10%

Several priorities at the national and regional level necessitate the need for increased personnel. First of all, implementation of FWPCA is moving from Phase I into Phase II. While Phase I emphasized the issuance of permits and award of construction grants, Phase II will concentrate on other areas such as nonpoint source pollution and toxic pollutants. The control of nonpoint sources such as runoff and acid mine drainage requires development of control strategies by the states and areawide planning agencies with oversight from the Regional EPA Office. A toxic substance control strategy must be developed to meet the 1983 goal. Phase I has been concerned with

experience in plant operations. This is accomplished through an agreement between the Region III Office and the state of Delaware. The water program also conducts a grants orientation course for employees.

Training courses in specialized wastewater subjects are provided through EPA's Office of Water Programs Operations at the National Training Center in Cincinnati, Ohio. Subjects offered include wastewater treatment technology, control of special pollution problems, and chemical analysis techniques. The courses are provided for personnel of state and local governments and private industry as well as federal government employees. The Region III Office personnel take advantage of these courses as often as possible and program managers encourage personnel to take advantage of educational opportunities in local colleges and universities.

D. Career Potential

Future careers in wastewater programs in the federal government will continue to require professional training. Since much of the effort will be in the general areas of technical assistance, enforcement, and review and monitoring activities, engineers will be in the greatest demand. A need for scientists and technicians will still exist as will a demand for administrative personnel required because of the large amount of paperwork involved in managing the program.

The greatest potential should exist at the local community level and in private industry. This is where the construction grant program and the NPDES permits have had their greatest impact. With the

the control of traditional pollutants but the recently passed Toxic Substances Control Act will require more effort toward eliminating toxic wastes.

In the NPDES program, permits can be granted for a duration of no more than five years. These permits have been issued to comply with 1977 requirements and when the initial permits expire the new permits will require compliance with the 1983 standards. During Phase II, compliance monitoring and enforcement will be the major efforts in this program, and will be a high priority activity within the region. Personnel will be required to audit states with NPDES delegation and carry out surveillance activities in non-NPDES states.

Another factor which will affect the workforce in the Regional Office is the recent court decisions to release 137 million dollars in 208 planning funds and to require states to do 208 planning in areas not already designated as 208 agencies. This, combined with the anticipation that EPA will be given over a billion dollars in sewage construction funds and several million dollars for new employees in supplemental funding for the program in FY 1977, will increase the workforce resources of the Regional Office. These activities are also expected to create a substantial number of additional positions in the states and municipalities.

C. Training and Certification

Despite the large number of employees in the wastewater program in Region III, the training conducted by the Regional Office is limited. In addition to on-the-job training provided to new employees, the program sends personnel to municipal treatment plants in Delaware for practical

increased number of wastewater facilities in operation, there exists a demand for trained personnel to operate and maintain the facilities in accordance with the law. State governments should also have an increasing demand for trained personnel as they take on more responsibilities in the administration of the wastewater treatment program.

E. Conclusion

EPA is entering the second phase in the implementation of FWPCA. Since the construction grant and NPDES programs are well underway, the administration of these programs can be delegated to the states to allow the federal government to concentrate on new priorities. New priorities will include the control of toxic pollutants and non-point pollution sources.

Wastewater is the largest of the environmental programs in the Regional Office in terms of manpower. Although it is hoped that the states will assume responsibility for adminstration of the programs, the Regional Office estimates that its staffing needs will continue to increase over the next five years. The demand will continue to be for professional personnel, particularly engineers.

VIII. ENERGY

The Region III U.S. Federal Energy Administration office in Philadelphia was created in December, 1973. The geographical area over which this Regional Office has jurisdiction conforms to the standard Federal Region structure. The Federal Energy Administration (FEA) receives its authority from the Energy Policy and Conservation Act of 1975 which amended the earlier Emergency Allocation Act, the Federal Energy Administration Act, and the Energy Conservation and Production Act. As a result, the role of the FEA has shifted from the allocation and pricing of petroleum products to the broader responsibility of developing a National Energy Policy to reduce our reliance on foreign energy sources, encourage development of traditional domestic energy reserves, attain a high degree of energy independence and eliminate wasteful energy practices in both the public and private sectors.

The Philadelphia Regional FEA Office has placed its primary emphasis upon auditing refiners to ensure that petroleum distributors/refiners pricing structure conforms to federal regulations. According to the Region III FEA 1977 Annual Report, the Region has been targeted to be one of the most nuclear power dense areas of the world. The region has a small coastal area along Delaware, Maryland and Virginia and this could serve as a resource for both tidal and thermal energy. There are also some dams along the .egion's major rivers, as well as major coal fields and some oil wells in Maryland, Virginia, West Virginia, and Pennsylvania.

The structure of the FEA Regional Offices is similar to the organizational system used in FEA Headquarters (see attached organizational chart). The various functions and staffing of the FEA Regional Office in Philadelphia are summarized as follows:

1) Regional Counsel: This group of five lawyers provide legal support to all divisions of Region III. The Regional Counsel serves as chief law officer and general legal advisor to the Regional Administrator and his staff. Also includes a secretary steno and a clerk.

2) Management and Planning: Provides planning and management advice and administrative support to the Regional Administrator and program staff; areas of responsibility include regional organization, manpower planning and coordination, financial management, data systems, personnel and security. This group of twelve persons include a director, a personnel management specialist, a budget and accounting officer, a fiscal and budget assistant, a voucher examiner, an offer service supervisor, a management analyst and five clerks.

3) Conservation and Resource Development: Develops and implements energy projects and programs to reduce energy demand through conservation and to increase domestic energy supplies leading to national energy self-sufficiency; responsible for grants processing under the State Energy Conservation program. The Energy Conservation & Resource Development Division is composed of personnel located in two programs and includes a director, an environmental specialist, a secretary and a clerk. The Energy Conservation Program is composed of a supervisory conservation specialist, three energy conservation specialists, and a secretary. The Resource Development Program includes a supervisory general engineer, two engineers, an energy resource specialist, and a clerk-typist.

4) Operations Division: Monitors supply and demand of energy resources throughout the Region and directs allocation actions involving distribution of fuels; provides a focal point at the Regional level for the referral of individuals needing guidance on all aspects of the Allocation Program. The Operations Division is staffed with twelve persons who include a director, a supervisory case resolution specialist, a case resolution specialist, five applications examiners, two case resolution officers, a secretary steno and a clerk typist.

5) Exceptions and Appeals: Provides the regulatory check on original decisions by evaluating and recommending a decision on exception and appeal requests; identifies and forwards to Headquarters those cases which impact upon major socio-economic groups or large geographical areas. Currently staffed with two exceptions and appeals officers.

6) Public Affairs: Provides point of contact for the press, television, radio, and other information media; coordinates all public statements, speeches, releases, publications, public reports, audio/visual, aid Freedom of Information requests and public distribution of materials. Staffed with a public information officer.

7) Intergovernmental Relations & Consumer Affairs: Maintains appropriate liasion and communications with members of Congress and their staffs on agency policies, programs, and operational activities; serves as liasion between FEA Regional Office and energy-related organizations of Federal, State and local governments; provides a focal point for matters relating to consumer affairs and the special impact target population. Staffed with five persons including a federal/state liaison officer who is located in a West Virginia FEA office. Staffing includes an intergovernmental relations officer, consumer affairs/ special impact officer, intergovernmental program specialist, a clerk typist, and the liaison officer.

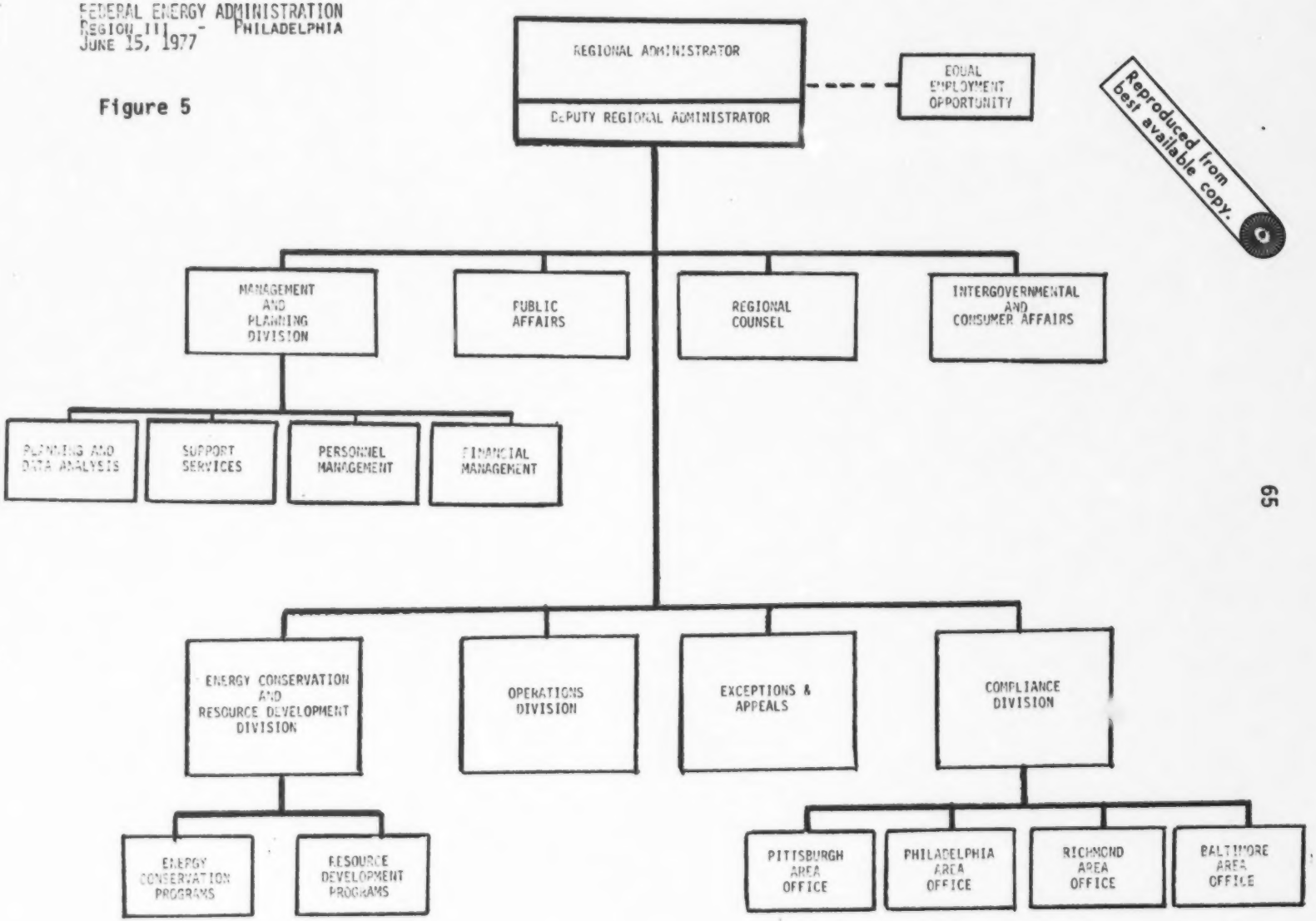
8) Compliance: Implements and supervises programs to assure the lawful and equitable distribution and pricing of crude oil and petroleum products; administers the implementation, compliance, and enforcement of all approved regulations related to agency program activities. Currently staffed with 84 persons located in four major Offices: Pittsburgh Area Office, Philadelphia Area Office, Richmond Area Office; and Baltimore Area Office and nine sub-offices under their jurisdictions. Staff include one director, five supervisory auditors, 54 auditors, 4 program analysts, ten investigators, and ten clerks.

According to the Region III FEA Office, there are a total of 140 persons working in the Region, including 84 in Philadelphia. Program administrators consider the staffing of the Region III Office to be an average size for the FEA Regional Offices. The staffing level has remained constant since the Office's creation in 1973-74. The Office of Management and Budget has ordered the Regional Office to reduce its staff to a level of 120 positions by September 31, 1977, so vacancies

cannot be filled once they occur. Although the Federal reorganization creating the new Department of Energy appears imminent, the FEA Regional Office is expected by program administrators to have between 140-145 positions on board by Fiscal Year 1978.

FEDERAL ENERGY ADMINISTRATION
REGION III - PHILADELPHIA
JUNE 15, 1977

Figure 5



Reproduced from best available copy.

SUMMARY

In order to effectively achieve their goals in the next five years, each of the seven pollution control and abatement programs covered in this study will require increased personnel resources. This is the common opinion expressed by the program managers and personnel interviewed. Overall, these persons based their projections of future growth in Region III rather conservatively, projecting figures on hard needs and the number of personnel they are likely to receive rather than what they want or have requested. A total increase of 262 persons in the regional programs is anticipated. The average rate of program growth is approximately 21% ranging from 10% anticipated in Pesticides and a 45% increase anticipated in the Noise Control program. In addition to the personnel in the program areas covered in this study, other personnel working in the Regional Administrator's Office, the Regional Counsel's Office, the Civil Rights and Public Affairs Offices, and Management and Enforcement Divisions, provide support activities to more than one program and cannot be classified into any one area.

A common goal among the programs in Region III is the delegation of responsibility for pollution control and abatement programs to state and local governments. The Regional personnel envision their roles as that of providing guidance and technical assistance, monitoring, reviewing, and enforcing federal regulations. To accomplish this, adequate staffing will be necessary in the Regional Office until such time as the states are able and willing to implement the programs adequately. If the states do not assume this responsibility, the Regional Office will have

to implement the programs. In either case, growth in Region III is anticipated to continue during the five year scope of this study.

The degree to which states are willing to assume responsibility for program implementation will have a dramatic effect on staffing levels in the Regional Office. Although most of the states in Region III have been willing to take the lead in the administration of environmental programs, several factors continue to impede the process. First of all, funding is a problem in each of the states. State budgets are limited and legislatures are looking at the environmental programs with increased scrutiny, especially when EPA will run a program if not administered by the state. Secondly, states are reluctant to initiate programs which may be politically unpopular, costly, and regional rather than statewide in nature. A direct correlation generally exists between the size of a state's program and the number of federal dollars spent on it. Thirdly, the amount of federal red-tape involved in a program often causes confusion to the states and discourages their participation. The continual revisions and changes in the laws also tend to increase skepticism in the states about the programs.

As previously indicated, the program personnel in Region III anticipate a significant increase in staffing over the next five years. The major portion of the increases will be at the professional level with the demand continuing for engineers and scientists. Opportunities will also become available for persons with technical training, although the demand for technicians will not be as great as that for professionals. Turnover has generally been low in the Regional Office (about 5-10%)

with much of it occurring in the clerical positions. Federal salaries and benefits are good, especially when compared with the states, and this may account for the employment stability. The real growth is expected to occur, however, in the private sector and in state and local governments, where the bulk of the workforce will be located.

The efforts in Region III over the next five years will focus on new priorities as well as the continuation of current activities. Toxic substances, radioactive waste disposal, integrated pest management, and underground injection control are some of the programs which will be receiving priority emphasis. It is impossible to project at this time accurate workforce figures on the impact of these programs in Region III. The Regional Office is moving aggressively to resolve environmental problems and provide the guidance and assistance to the states that is necessary for the success of the programs. With the cooperation of Delaware, the District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia, the efforts of the Regional Office will meet with continued success.

Bibliography

Articles and Periodicals

Ardill, John. "Controlling Water From Source to Tap - A New National Strategy," Water and Sewage Works, CXX, No. 1 (January, 1973), p. 56.

Berman, Fred. "Conserving the Future: America's Scrap Processing Industry," Phoenix Quarterly, IV, No. 4 (1973), p. 3.

Billings, Leon G. "The New Water Pollution Control Law," Plant Engineering, XXVII, No. 2 (January 25, 1973), p. 109.

Bragdon, Clifford R. "Municipal Noise Ordinances - 1976," Sound and Vibration (December, 1976), pp. 22-27.

Bureau of National Affairs. Environment Reporter. I-VII. Washington, D.C.: 1977.

Burton, Ian. "The Quality of Environment: A Review," Geographical Review, L, No. 3 (July, 1968), p. 472.

"Chemical Waste Swapping: Promising, but no panacea," Chemical Engineering (July 5, 1976).

Cook, Raymond L. "A New Era in Operation and Maintenance of Wastewater Treatment Plants," Georgia Operator, X, No. 2 (Fall, 1972), p. 12.

Courchaine, C. "A Practical Method for the Sanitarian's Review of Design of Small Public Water-Supply Systems," Ground Water, XI, No. 1 (January-February, 1973), p. 32.

Dajani, Jarir S., et al. "Optimal Designing of Urban Wastewater Collection Networks," Journal of the Sanitary Engineering Division, XCVIII, SA6 (December, 1972), p. 853.

Dean, T. A. "Calculating OSHA Noise Compliance," Pollution Engineering, V, No. 1 (January, 1973), p. 43.

Dryden, S. L. and Judd, S. H. "Think 'Quiet' From Initial Design to Plant Operation," Oil and Gas, MCMLXXI, No. 8 (February 19, 1973), p. 102.

"Electric Power and Clean Air - Can We Have Both?," Tennessee Valley Perspective, III, No. 4 (Summer, 1973), pp. 18-22.

"EPA Annual Report," Pollution Engineering Magazine, VII, No. 12 (December, 1975), pp. 34-65.

Ganotis, Chris G. and Hopper, Richard E. "The Resource Recovery Industry," Environmental Science and Technology, X (May, 1976), p. 425.

Haag, Fred G. "State Noise Restrictions - 1976," Sound and Vibration (December, 1976), p. 27.

Hale, Samuel, Jr. "Solid Waste Management - Closing the Circle," Secondary Raw Materials, X, No. 12 (December, 1972), p. 86.

Hamilton, William S. "Practical Noise Abatement for a General Aviation Airport," Sound and Vibration (February, 1977), pp. 24-27.

Higdon, Ralph E. "Understanding Reverse Osmosis," American City, XII, No. 87 (December, 1972), p. 55.

Hochheiser, Robert M. "How to Control Noise," Plant Engineering, XXVI, No. 20 (October 5, 1972), p. 90.

Hollowell, Craig D. and McLaughlin, Ralph D. "Instrumentation For Air Pollution Monitoring," Environmental Science and Technology, VII, No. 11 (November, 1973), p. 1011.

Kenaga, Eugene E. "Guidelines for Environmental Study of Pesticides: Determination of Bioconcentration Potential," Residue Reviews, XLIV (1972), p. 73.

Khan, A. N. and Siddiqi, R. H. "Treatment of Waste Water By Biological Discs," Indian Journal of Environmental Health, IV, No. 14 (October, 1972), p. 289.

Koczkur, Eugene, et al. "Noise Monitoring and a Sociological Survey of the City of Toronto," Air Pollution Control Association Journal, XXIII, No. 2 (February, 1973), p. 105.

Larsen, Ralph I. "An Air Quality Data Analysis System for Interrelating Effects, Standards, and Needed Source Reductions," Air Pollution Control Agency Journal, XXIII, No. 11 (November, 1973), p. 933.

Levy, Steven J. "Pyrolysis of Municipal Solid Waste," Waste Age (October, 1974).

Lingle, Stephen A. "Paper Recycling in the United States," Waste Age (November, 1974).

Meyers, Sheldon. "EPA and Municipal Resource Recovery," NCRR Bulletin, VI, No. 3 (Summer, 1976).

Miller, E. F. "Desalting as a Source of Water Supply," American Water Works Association Journal, LXIV, No. 12 (December, 1972) p. 804.

Miller, Stanton S. "The Business of Air Pollution Control," Environmental Science and Technology, VII, No. 11 (November, 1973), p. 988.

National Center for Resource Recovery. NCRR Update Monthly. VI, No. 2. Washington, D.C.: February, 1977.

Neal, Lawrence A. and Hervig, Roy A. "Mathematical Water Quality Models," Georgia Operator, X, No. 2 (Fall, 1972), p. 21.

O'Keefe, Andrew E. "The Old, the New, and the Future in Air Pollution Instruments," Clean Air, VII, No. 3 (August, 1973) p. 50.

Parken, Gene F. and Dague, Richard R. "Optimal Design of Wastewater Treatment Systems by Enumeration," Journal of the Sanitary Engineering Division, XCVIII, SA6 (December, 1972), p. 833.

Peterson, Bob. "There's Gold in Your Garbage," Scouting, LXII, No. 7 (October, 1974), pp. 46-48, 84-86.

Ruckelshaus, William D. "Solid Waste Management: An Overview," Public Management (October, 1972).

Rylander, R., et al. "Sonic Boom Effects on Sleep - A Field Experiment on Military and Civilian Populations," Journal of Sound and Vibration, XXIV, No. 1 (1972), p. 41.

"Selected Manufacturers of Equipment to Control Liquid and Solid Hazardous and Toxic Wastes," Pollution Engineering (April, 1976).

Sharpe, Dr. Lois. "What the People Want You to Do with Solid Waste," APWA Reporter, XL, No. 1 (January, 1973), pp. 8-9.

Shippee, Edgar G. "Materials For Noise Absorption," Pollution Engineering, V, No. 1 (January, 1973), p. 37.

Shuster, Kenneth A. "Fuel Conservation in Solid Waste Management," Virginia Town and Country (December, 1974).

Smith, Philip W. "TVA: Making Peace in the Tennessee Valley," The South (May-June, 1976).

Solid Waste Systems. V, No. 5. Los Angeles: Systems Publishing, Inc.. October-November, 1976.

Souci, Gary. "Solid Waste: The New Apocalypse," Audubon, LXXV, No. 1 (January, 1973), p. 114.

Studeny, John. "Waste Paper Recycling: Issues and Answers, Part I," Printing Magazine (December, 1972), p. 50.

Terango, Larry. "The Environmentalists' Concern With Noise-Induced Hearing Loss," Journal of Environmental Health, XXXV, No. 4 (January-February, 1973), p. 350.

Train, Russell E. "The Uses and Abuses of Waste," Compost Science - Journal of Waste Recycling, XVI, No. 3 (May-June, 1975).

"U.S. Finds a Rich Resource: The Nation's Trash Pile," U.S. News & World Report (May 13, 1974), pp. 63-66.

Van Buskirk, R. B. "Can We Get Out of the Pesticide 'Jungle'?," Farm Chemicals and Croplife, CXXXV, No. 12 (December, 1972), p. 42.

Voegtle, John A. and Vilin, Frank J. "A New Concept for Operator Wages," Water Pollution Control Federation Journal, XLV, No. 2 (February, 1973), p. 203.

Walker, Thomas. "Recycling and Solid Waste Management: Economic Compatibility," Secondary Raw Materials, X, No. 12, (December, 1972), p. 88.

Waroff, Deborah. "Recycled Paper," Architectural Design, XLII, No. 11 (1972), p. 673.

Wood, Frank O. "Selecting Softening Process," American Water Works Association Journal, LXIV, No. 12 (December, 1972), p. 820.

Yerges, Lyle F. "Turn the Noise Down," Oil and Gas, LXXI, No. 2 (January 8, 1973), p. 109.

Zaporozec, Alexander. "Groundwater Zoning in Water Resource Management," Water Resources B, VIII, No. 6 (December, 1972), p. 1137.

Books

A Work Force for Environment and Energy, A Master Plan for Environmental/Energy Higher Education in Illinois. Springfield, Illinois: For the Illinois Board of Higher Education, 1975.

Anthrop, Donald F. Noise Pollution. Lexington, Mass.: Lexington Books, 1973.

Astmann, Robert C. (ed.). Rescuing Man's Environment: Nine Essays on Environmental Reform. Princeton, N.J.: Princeton University Council on Environmental Studies, 1972.

Bakish, Robert. Practice of Desalination. Park Ridge, N.J.: Noyes Data Corp., 1973.

Battan, L. J. The Unclean Sky. Science Study Series. New York: Doubleday Anchor, 1966.

Beatty, Rita Gray. The DDT Myth: Triumph of the Amateurs. New York: John Day Co., 1973.

Behan, R. W. and Weddle, Richard M. (eds.). Ecology, Economics, Environment. Missoula, Montana: University of Montana Press, 1971.

Bloodgood, Don E. Sewage Treatment Practice. Chicago: Scranton Publishing Co., Inc.

Bond, Richard G., et al. (eds.). Air Pollution. Cleveland: CRC Press, 1972.

Bond, Richard G. and Straub, Conrad P. (eds.). CRC Handbook of Environmental Control. Cleveland: CRC Press, 1972.

Brodine, Virginia. Air Pollution. New York: Harcourt Brace Jovanovich, 1973.

Brown, Carl, et al. Decision-Making in Water Resource Allocations. Lexington, Mass.: Lexington Books, 1973.

Carson, John Michael, et al. Community Growth and Water Resources Policy. New York: Praeger Publications, 1973.

Council of State Governments. Our Effluent Society. Lexington, Kentucky: February, 1974.

Council of State Governments. The States' Roles in Solid Waste Management - A Task Force Report. Lexington, Kentucky: April, 1973.

Cross, Frank L., Jr. Corporate Communicators' Guide for Environmental Control. Westport, Conn.: Technomic, 1973.

Cross, Frank L., Jr. and Noble, George. Handbook on Hospital Solid Waste Management. Westport, Conn.: Technomic Publications, 1973.

Cross, Frank L., Jr. Handbook on Incineration: Guide to Theory, Design, Operation, and Maintenance. Westport, Conn.: Technomic Publications, 1972.

Detwyler, Thomas R. (ed.). Man's Impact on Environment. New York: McGraw-Hill, 1971.

Dickey, John W., et al. Technology Assessment: Its Applications to the Solid Waste Management Programs of Urban Government. Lexington, Mass.: Lexington Books, 1973.

Dolgin, Erica L. and Guilbert, Thomas G. P. (eds.). Federal Environmental Law. St. Paul: West Publishing Co., 1974.

Dorfman, Robert. Models For Managing Regional Water Quality. Cambridge, Mass.: Harvard University Press, 1973.

Durrenberger, Robert W. Dictionary of Environmental Sciences. Palo Alto, Calif.: National Press Books, 1973.

Eckenfelder, W. W., Jr., and Cecil, L. K. (eds.). Applications of New Concepts in Physical-Chemical Wastewater Treatment. Elmsford, N.Y.: Pergamon Press, 1972.

Edmunds, Stahrl and Letey, John. Environmental Administration. New York: McGraw-Hill, 1973.

Educational Research Council of America. Challenges of Our Time: Technology: Promises and Problems. Boston: Allyn and Bacon, 1972.

Edwards, C.A. (ed.). Environmental Pollution by Pesticides. New York: Plenum Publications, 1973.

Environmental Information Center. The Environmental Regulations Handbook. New York: Environmental Information Center, 1973.

Fahy, Elmore R. Guide to the Packaging of Hazardous Materials and the Legal Requirements of the Regulatory System. New York: McGraw-Hill, 1973.

Fegely, Thomas, et al. Recycling: An Interdisciplinary Approach to Environmental Education. Emmaus, Pa.: Rodale, 1973.

Golueke, C. G. Composting: A Study of the Processes and Its Principles. Emmaus, Pa.: Rodale, Press, 1973.

Goodman, Charles R., et al. (eds.). Environmental Quality and Water Development. San Francisco: W. H. Freeman, 1973.

Graham, Frank, Jr. Since Silent Spring. Greenwich, Conn.: Fawcett Publications, Inc., 1970.

Gunter, John D. and Jameson, William Carl. Solid Waste Management: Economics and Operation. Monticello, Ill.: Council of Planning Librarians Exchange Bibliographies, 1973.

Hann, Roy W., Jr. Fundamental Aspects of Water Quality Management. Westport, Conn.: Technomic Publications.

Harrison, James D. Environmental Preferences: Relevant Studies for Urban Planning. Monticello, Ill.: Council of Planning Librarians Exchange Bibliographies, 1973.

Haskell, Elizabeth H. and Price, Victoria S. State Environmental Management: Case Studies of Nine States. New York: Praeger Publications, 1973.

Haveman, Robert H. and Knesse, Allen V. The Economics of Environmental Policy. New York: J. Wiley, 1973.

Hendricks, Charles W., et al. Fresh Water Pollution. New York: MSS Information Corp., 1973.

Hertzendorf, Martin S. Understanding and Controlling Air Pollution. Westport, Conn.: Science Publications, 1972.

Hesketh, Howard E. Understanding and Controlling Air Pollution. Ann Arbor, Mich.: Science Publications, 1972.

Holl, Karl. Water: Examination, Assessment, Conditioning, Chemistry, Bacteriology, Biology. Berlin, N.Y.: De Gruyter, 1972.

Izaak Walton League of America. A Citizen's Guide to Clean Water. Arlington, Va.: June, 1973.

Jukes, Thomas, et al. Effects of DDT on Man and Other Mammals. New York: MSS Information Corp., 1973.

King, Richard L. Airport Noise Pollution: A Bibliography of Its Effects on People and Property. Metuchen, N.J.: Scarecrow Press, 1973.

Klopfer, Peter H. Behavioral Aspects of Ecology. Englewood Cliffs, N.J.: Prentice-Hall, 1973.

Lee, Douglas H. K. Environmental Factors in Respiratory Disease. New York: Academic Press, 1972.

Lee, Kaiman (ed.). Bibliography of the Computer in Environmental Design. Boston: Center for Environmental Research, 1972.

Leithe, W. An Analysis of Air Pollutants. Ann Arbor, Mich.: Humphrey Science Publishers, 1970.

Leithe, Wolfgang. The Analysis of Organic Pollutants in Water and Wastewater. Ann Arbor, Mich.: Ann Arbor Scientific Publications, 1973.

Martin, Hubert (ed.). Insecticide and Fungicide Handbook for Crop Protection. Oxford, U.K.: Blackwell Scientific, 1972.

Mitchell, Ralph (ed.). Water Pollution Microbiology. New York: John Wiley and Sons, Inc., 1972.

Morell, Ben. Our Nation's Water Resources: Policies and Politics. New York: Arno Press, 1972.

National Association for Environmental Education. Selected Environmental Education Programs in North American Education. Edited by Arden L. Pratt, 1974.

National Wildlife Federation. Conservation Directory 1977. Edited by Gloria H. Decker. Washington, D.C.: The National Wildlife Federation, 1977.

New York Health Education Service. Manual of Instruction for Sewage Treatment Plant Operators. Albany: New York Health Education Service.

Newell, Frederick Haynes. Water Resources: Present and Future Uses. New York: Arno Press, 1972.

Noll, Kenneth and Duncan, Joseph (eds.). Industrial Air Pollution Control. Ann Arbor, Mich.: Ann Arbor Science Publishers, 1973.

Oliver, Henry. Irrigation and Water Resources Engineering. New York: Crane, Rusak, 1972.

Pazar, C. Air and Gas Cleanup Equipment. 2d ed. Park Ridge, N.J.: Noyes Data Corp., 1972.

Perera, Thomas and Perera, Gretchen. Louder and Louder: The Dangers of Noise Pollution. New York: E. Watts, 1973.

Pettyjohn, Wayne A. Water Quality in a Stressed Environment: Readings in Environmental Hydrology. Minneapolis: Burgess Publications, 1972.

Pursglove, L. A. and Mancy, K. H. Elements of Biological Wastewater Treatment - Overview. Unit 1, Part 1. Ann Arbor, Mich.: University of Michigan School of Public Health, 1968.

Ranney, David C. Water - Quality Management: An Analysis of Institutional Patterns. Madison: University of Wisconsin Press.

Ranney, M. W. Soundproofing Building Materials. Park Ridge, N.J.: Noyes Data Corp., 1970.

Robinson, D. W. The Relationship Between Hearing Loss and Noise Exposure. Teddington, England: National Physical Laboratory, 1973.

Rodier, Jean. Chemical and Physiochemical Analysis of Water. New York: J. Wiley, 1973.

Roelofs, Robert T., et al. (eds.). Environment and Society: A Book of Readings on Environmental Policy, Attitudes, and Values. Englewood Cliffs, N.J.: Prentice-Hall, 1973.

Russell, Helen R. Earth, the Great Recycler. Nashville, Tenn.: Nelson, 1973.

Schildhaver, Carol. Environmental Information Sources: Engineering and Industrial Applications; A Selected and Annotated Bibliography. New York: Special Libraries Association, 1972.

Scorer, Richard Segar. Pollution in the Air: Problems, Policies and Priorities. London, Boston: Routledge and Kegan Paul, 1973.

Shaw, Bill. Environmental Law, People, Pollution and Land Use. St. Paul: West Publishing Co., 1976.

Shepart, Merle (ed.). Insect Pest Management: Readings. New York: MSS Information Corp., 1973.

Sherman, Anthony C. Land and Trash: Our Wounded Land. West Haven, Conn.: Pendulum Press, 1972.

Sherod, H. Floyd (ed.). Environment Law Review. New York: Clark Boardman, 1972.

Spyer, Geoffrey. Architect and Community: Environmental Design in Urban Society. London: Owen, 1971.

Stephan, David L. and Schaffer, Robert B. Waste Treatment and Renovation Status of Process Development. Part 1. Washington, D.C.: Journal of Water Pollution Control Federation, 1970.

Stern, A. C. Air Pollution. Vol. I, II. New York: Academic Press, 1962.

Stern, A. C. (ed.). Air Pollution: A Comprehensive Treatise. Vol. I, II, III. 2d ed. New York: Academic Press, 1968.

Tennessee Energy Office. Tennessee Energy Handbook. Nashville: Tennessee Energy Office, 1975.

Texas Water Utilities Association. Manual of Wastewater Operations. Austin: Texas Water Utilities Association, 1971.

Thibeau, Charles E. Annual Directory of Environmental Information Sources. Boston: Cahners Books, 1972.

Van Tassel, Alfred J. Our Environment: The Outlook for 1980. Lexington, Mass.: Lexington Books, 1973.

Van Valkenburg, Wade (ed.). Pesticide Formulations. New York: M. Dekker, 1973.

Vivian, V. Eugene. Sourcebook for Environmental Education. St. Louis: Mosby, 1973.

Walsbott, George L. Health Effects of Environmental Pollutants. St. Louis: Mosby, 1973.

Water Pollution Control Federation. Manuals of Practice. Washington, D.C.: Water Pollution Control Federation.

Welch, Bruce L., and Welch, Annemarie S. (eds.). Physiological Effects of Noise. New York: Plenum Press, 1970.

Westberg, Karl, et al. The Chemistry of Smog. New York: MSS Information Corp., 1973.

Williamson, Samuel J. Fundamentals of Air Pollution. Reading, Mass.: Wesley Publishers, 1973.

Wilson, David Gordon. The Treatment and Management of Urban Solid Waste. Westport, Conn.: Technomic Publications, 1972.

Public Documents

Citizen's Advisory Committee on Environmental Quality. Report to the President and to the Council on Environmental Quality. Washington, D.C.: December 31, 1975.

Council on Environmental Quality, Federal Interagency Task Force. A Recommended Air Pollution Index. September, 1976.

Council on Environmental Quality. Integrated Pest Management. November, 1972.

Council on Environmental Quality. Environmental Quality. Second Annual Report. August, 1971.

Council on Environmental Quality. Environmental Quality. Fifth Annual Report. December, 1974.

Council on Environmental Quality. Environmental Quality. Sixth Annual Report. December, 1975.

Council on Environmental Quality. Environmental Quality. Seventh Annual Report. September, 1976.

Council on Environmental Quality. OCS Oil and Gas - An Environmental Assessment. April, 1974.

Council on Environmental Quality and Federal Council for Science and Technology. The Role of Ecology in the Federal Government. Washington, D.C.: December, 1974.

U.S. Department of Agriculture. Farmers' Use of Pesticides in 1971... Quantities. Agricultural Report No. 252, July, 1974.

U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service. The Pesticide Review - 1974. September, 1975.

U.S. Department of Health, Education and Welfare, Office of Environmental Education (Contract to Kirkwood Community College, Cedar Rapids, Iowa). A Curriculum Report - Integrated Pest Management. 1973.

U.S. Department of Health, Education and Welfare. Report of State and Local Radiological Health Programs. July, 1976.

U.S. Department of the Interior, Federal Water Pollution Control Administration, Great Lakes Region. Clean Water for Mid-America. Washington, D.C.: U.S. Government Printing Office, 1970.

U.S. Department of the Interior, Federal Water Quality Administration. Clean Water Quality for the 1970's. Washington, D.C.: U.S. Government Printing Office, 1970.

U.S. Department of the Interior, Office of Saline Water Report 779. The Economic Value of Water Quality. Washington, D.C.: U.S. Government Printing Office, January, 1972.

U.S. Department of Labor. "Employment in Nuclear Energy Activities." NEWS. June 28, 1976.

U.S. Department of Labor, Bureau of Labor Statistics. Impact of Federal Pollution Control and Abatement Expenditures on Manpower Requirements. Bulletin No. 1836, 1975.

U.S. Environmental Protection Agency, Office of Water Program Operations. A Classification System for Water and Wastewater Facilities and Personnel, Part 3 - Existing Examination Systems: A Current Status Report, prepared by the Association of Boards of Certification for Operating Personnel in Water and Wastewater Utilities. April, 1976.

U.S. Environmental Protection Agency, Office of Public Affairs. A Drop to Drink - A Report on the Quality of our Drinking Water. June, 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. A Nationwide Survey of Resource Recovery Activities, by Richard E. Hopper. A Current Report on Solid Waste Management Series Publication No. 142, March, 1975.

U.S. Environmental Protection Agency, Division of Manpower Training. A Two-Year Water Quality Monitoring Curriculum, prepared by Ulster County Community College, Stone Ridge, New York. September, 1975.

U.S. Environmental Protection Agency, Office of Education and Manpower Planning. Abatement and Pollution Control Training and Educational Programs Presented by the U.S. EPA - July 1973 - June 1975. 1975.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. About Sound. Washington, D.C.: May, 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. An Accounting System for Solid Waste Shredders. A Current Report on Solid Waste Management, Series Publication No. 154, May, 1975.

U.S. Environmental Protection Agency, Office of Public Affairs. An Overview of Pesticide Applicator Certification. February, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Anaerobic Digestion of Solid Waste and Sewage Sludge to Methane. A Current Report on Solid Waste Management, Series Publication No. 159, July, 1975.

U.S. Environmental Protection Agency. Area and Agency Designation Handbook for Section 208 Area-wide Waste Treatment Management Planning. December, 1974

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Basic Issues on Solid Waste Management Affecting County Government, prepared by National Association of Counties. May, 1973.

U.S. Environmental Protection Agency. Beneficial Use of Storm Water. Washington, D.C.: U.S. Government Printing Office, January, 1973.

U.S. Environmental Protection Agency, Office of Public Affairs. Building for Clean Water. August, 1975.

U.S. Environmental Protection Agency. "Certification of Pesticide Applicators." Federal Register. Vol. 39, No. 197, October 9, 1974.

U.S. Environmental Protection Agency, Office of Legislation, Public Inquiries Branch. The Challenge of the Environment: A Primer on EPA's Statutory Authority. Washington, D.C.: December, 1972.

U.S. Environmental Protection Agency, Office of Public Affairs. Clean Air and Your Car. March, 1974.

U.S. Environmental Protection Agency, Office of Public Affairs. Clean Air the Breath of Life. April, 1976.

U.S. Environmental Protection Agency, Mobile Source Pollution Control Office. Control Strategies for In-Use Vehicles. Washington, D.C.: December, 1972.

U.S. Environmental Protection Agency, Water Planning Division. Cost Analysis Handbook for Section 208 Areawide Waste Treatment Management Planning Federal Assistance Applications. May, 1975.

U.S. Environmental Protection Agency. DDT - A Review of Scientific and Economic Aspects of the Decision to Ban its Use as a Pesticide. July, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Mangement Programs. Decision-Makers Guide in Solid Waste Management. Washington, D.C.: U.S. Government Printing Office, 1976.

U.S. Environmental Protection Agency, Office of Pesticide Programs. Digest of State Pesticide Use and Application Laws. 1977.

U.S. Environmental Protection Agency. "Effective Hazardous Waste Management (Non-radioactive) Position Statement." Federal Register. Vol. 41, No. 161, August 18, 1976.

U.S. Environmental Protection Agency, Resource Recovery Division. Energy Conservation through Improved Solid Waste Mangement, by Robert A. Lowe. Solid Waste Management Series Publication No. 125, 1974.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Energy Recovery from Waste. Solid Waste Management Series Publication No. 36d.ii, 1973.

U.S. Environmental Protection Agency. "EPA Amends Funding Formula for Areawide Planning Grants." Environmental News. October 14, 1976.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. EPA Noise Control Program - Progress to Date. May, 1976.

U.S. Environmental Protection Agency. "EPA Seeking Greater Public Involvement in Water Quality Management Programs." Environmental News. October 22, 1976.

U.S. Environmental Protection Agency. "Environmental Radiation Protection Standards for Nuclear Power Operations." Federal Register. Vol. 42, No. 9, January 13, 1977.

U.S. Environmental Protection Agency, Office of Radiation Programs, Joint Study of the Atomic Energy Commission and the Department of Health, Education and Welfare. Estimates of Ionizing Radiation Doses in the United States, 1960 - 2000. Rockville, Md.: August, 1972.

U.S. Environmental Protection Agency, Region IV, Office of Water Programs, Water Supply Branch. Evaluation of the Florida Water Supply Program. Atlanta: 1973.

U.S. Environmental Protection Agency, Office of Public Affairs. Everybody's Business - The Resource Conservation and Recovery Act of 1976. February, 1977.

U.S. Environmental Protection Agency, Office of Pesticide Programs, Office of Water and Hazardous Materials. Farmer's Pesticide Use Decisions and Attitudes on Alternate Crop Protection Method. 1974.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Financing Solid Waste Management in Small Communities, by Eric R. Zausner. 1971.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. First Report to Congress: Resource Recovery and Source Reduction. 1974.

U.S. Environmental Protection Agency, Office of Public Affairs. First Things First. September, 1974.

U.S. Environmental Protection Agency, Office of Research and Monitoring. Full Scale Parallel Activated Sludge Process Evaluation. Washington, D.C.: November, 1972.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Goals of the Federal Solid Waste Management Program, by Sheldon Meyers. 1976.

U.S. Environmental Protection Agency. "Grants to State and Designated Areawide Planning Agencies - Conditions, Policies and Procedures." Federal Register. Vol. 40, No. 230, November 28, 1975.

U.S. Environmental Protection Agency, Air Pollution Technical Information Center. Guide for Compiling a Comprehensive Emission Inventory. Research Triangle Park, N.C.: January, 1972.

U.S. Environmental Protection Agency, Air Pollution Technical Information Center. Guide to Research in Air Pollution. Research Triangle Park, N.C.: 1972.

U.S. Environmental Protection Agency. Guidelines for Areawide Waste Treatment Management Planning. August, 1975.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. Guidelines for Developing a Training Program in Noise Survey Techniques. July, 1975.

U.S. Environmental Protection Agency, Office of Water and Hazardous Materials. Guidelines for Preparation of Water Quality Management Plans. September, 1974.

U.S. Environmental Protection Agency, Office of Water Programs Operations. Guidance for Preparing a Facility Plan. May, 1975.

U.S. Environmental Protection Agency, Air Pollution Technical Information Center. Guidelines for Technical Services of a State Air Pollution Agency. Research Triangle Park, N.C.: November, 1972.

U.S. Environmental Protection Agency, Office of Education and Manpower Planning. Guidelines to Career Development for Wastewater Treatment Plant Personnel. September, 1973.

U.S. Environmental Protection Agency, Office of Solid Waste Management. Hazardous Wastes. Solid Waste Management Series Publication No. 138, 1975.

U.S. Environmental Protection Agency, Office of Public Affairs. Hazardous Wastes and their Management. Environmental Information Series, May, 1975.

U.S. Environmental Protection Agency, Office of Public Affairs. Health Effects of Air Pollutants. June, 1976.

U.S. Environmental Protection Agency. "Home Study Course on Wastewater Collection Systems." Environmental News. August 26, 1976.

U.S. Environmental Protection Agency, Office of Air and Water Programs. Improving Water Quality Management in Nonmetropolitan Areas. Washington, D.C.: January, 1973.

U.S. Environmental Protection Agency. Incentives for Recycling and Reuse of Plastics - A Summary Report. Solid Waste Management Series Publication No. 41c.1, 1973.

U.S. Environmental Protection Agency, Office of Pesticide Programs, Office of Water and Hazardous Materials. Incremental Cost Impacts of the 1972 Federal Insecticide, Fungicide and Rodenticide Act as Amended. January, 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management. Intergovernmental Approaches to Solid Waste Management, by Richard O. Toftner and Robert M. Clark. 1971.

U.S. Environmental Protection Agency, Office of Air and Water Programs. Inventory of Interstate Carrier Water Supply Systems. Washington, D.C.: July, 1972.

U.S. Environmental Protection Agency, Water Planning Division. Interior Output Evaluation Handbook for Section 208 Areawide Waste Treatment Management Planning. June, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Mangement Programs. Land Availability, Crop Production and Fertilizer Requirements in the United States. A Current Report on Solid Waste Management, October, 1975.

U.S. Environmental Protection Agency. Management Agencies Handbook for Section 208 Areawide Waste Treatment Management. September, 1975.

U.S. Environmental Protection Agency. Management of Nonpoint Sources and District Action, by Eckhardt C. Beck. February 3, 1976.

U.S. Environmental Protection Agency. Manpower and Training Needs for Air Pollution Control. Washington, D.C.: U.S. Government Printing Office, 1970.

U.S. Environmental Protection Agency, Office of Water Program Operations, Manpower Development Staff. Manpower Requirements for Wastewater Collection Systems in Cities and Towns up to 150,000 in Population. June, 1973.

U.S. Environmental Protection Agency. Markets and Technology for Recovering Energy from Solid Waste, by Steven J. Levey. Solid Waste Management Series Publication No. 130, 1974.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Market Locations for Recovered Materials. A Current Report on Solid Waste Management Series Publication No. 518, August, 1976.

U.S. Environmental Protection Agency. "Materials Recovery - Solid Waste Management Guidelines for Source Separation." Federal Register. Vol. 40, No. 181, September 17, 1975.

U.S. Environmental Protection Agency and National Institute of Municipal Law Officers. Model Community Noise Control Ordinance. September, 1975.

U.S. Environmental Protection Agency. "National Interim Primary Drinking Water Regulations." Federal Register. Vol. 40, No. 248, December 24, 1975.

U.S. Environmental Protection Agency. No Small Task: Establishing National Effluent Limitations Guidelines and Standards. Washington, D.C.: U.S. Government Printing Office, 1976.

U.S. Environmental Protection Agency, Office of Public Affairs. Noise Around our House. February, 1977.

U.S. Environmental Protection Agency, Office of Public Affairs. Noise Control Programs of the Federal Government. July, 1976.

U.S. Environmental Protection Agency, Office of Noise Control and Abatement. Noise Facts Digest. Washington, D.C.: June, 1972.

U.S. Environmental Protection Agency. Noise from Heavy Construction. August, 1972.

U.S. Environmental Protection Agency, Office of Public Affairs. Noise Pollution. September, 1974.

U.S. Environmental Protection Agency. Noise Programs of Professional/Industrial Organizations, Universities and Colleges. EPA Report NTID300.9. Washington, D.C.: U.S. Government Printing Office, 1971.

U.S. Environmental Protection Agency. O & M - Making Wastewater Treatment Work in Your Community. May, 1974.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. Passenger Noise Environments of Enclosed Transportation Systems. June, 1975.

U.S. Environmental Protection Agency, Office of Public Affairs. Pesticide Registration: How It Protects You, Your Family and the Environment. February, 1974.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. Portable Air Compressor Noise Emission Standards. 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Proceedings 1975 Conference on Waste Reduction. April, 1975.

U.S. Environmental Protection Agency. Progress in the Prevention and Control of Air Pollution in 1974 - Report to Congress. 1975.

U.S. Environmental Protection Agency, Office of Radiation Programs. Radiological Quality of the Environment. May, 1976.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. Railroad Noise Emission Standard. 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Recovering Resources from Solid Waste Using Wet-Processing, by David G. Arella. Solid Waste Management Series Publication No. 47d, 1974.

U.S. Environmental Protection Agency, Office of Solid Waste Management. Recycling and the Consumer. Solid Waste Management Series Publication No. 117, 1974.

U.S. Environmental Protection Agency, Region I. Regional Administrator's Annual Report - Environmental Quality in New England. Boston: August, 1975.

U.S. Environmental Protection Agency. Relationship Between Animal Wastes and Water Quality. Washington, D.C.: EPA Publications Branch, June, 1972.

U.S. Environmental Protection Agency. "Residential, Commercial and Institutional Solid Wastes - Proposed Guidelines for Storage and Collection." Federal Register. Vol. 40, No. 134, July 11, 1975.

U.S. Environmental Protection Agency. Residential Paper Recovery: A Municipal Implementation Guide, by Penelope Hansen. 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Resource Recovery and Land Protection: An Environmental Imperative, by Arsen J. Darnay, Jr. 1974.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Resource Recovery Plant Implementation: Guides for Municipal Officials - Financing, by Robert E. Randol. Solid Waste Management Series Publication No. 157.4, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Resource Recovery Plant Implementation: Guides for Municipal Officials - Further Assistance, by Denise Hawkins. Solid Waste Management Series Publication No. 157.8, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. San Diego County Demonstrates Pyrolosis of Solid Waste, by Steven J. Levy. Solid Waste Management Series Publication No. 80d.2, 1975.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Separating Paper at the Waste Source for Recycling, by Stephen Lingle. Solid Waste Management Series Publication No. 128, 1974.

U.S. Environmental Protection Agency. The Social Impact of Noise. EPA Report NTID300.11. Washington, D.C.: U.S. Government Printing Office, 1971.

U.S. Environmental Protection Agency, Office of Public Affairs, Public Inquiries Branch. Solid Waste Management: A List of Available Literature. Washington, D.C.: January, 1972.

U.S. Environmental Protection Agency. Solid Waste Management: Abstracts from the Literature, 1968. EPA Report SW-66.4c. Washington, D.C.: U.S. Government Printing Office, 1972.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Solid Waste Management: Available Information Materials. Washington, D.C.: November, 1975.

U.S. Environmental Protection Agency. "Solid Waste Management - Guidelines for Beverage Containers." Federal Register. Vol. 40, No. 220, November 13, 1975.

U.S. Environmental Protection Agency, Office of Pesticide Programs. Standards for Certification of Pesticide Applicators. October, 1974.

U.S. Environmental Protection Agency, Office of Noise Abatement and Control. State and Municipal Noise Control Activities 1973 - 1974. January, 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. State Program Implementation Guide: Hazardous Waste Transportation Control. A Current Report on Solid Waste Management, Series Publication No. 512, March, 1976.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. State Solid Waste Management Agencies. March, 1976.

U.S. Environmental Protection Agency. Study of Manpower Needs for Implementation of the Water Pollution Control Act Amendments of 1972 - Report No. 1: Estimate of State Water Pollution Control Agency Manpower Needs. November, 1975.

U.S. Environmental Protection Agency. Study of Manpower Needs for Implementation of the Water Pollution Control Act Amendments of 1972 - Report No. 2. November, 1975.

U.S. Environmental Protection Agency, Library Systems Branch. Summaries of Foreign Governments Environmental Reports. Washington, D.C.: November, 1972.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. Summaries of Solid Waste Intramural Research and Development Projects, by Andrew W. Breidenbach. 1971

U.S. Environmental Protection Agency, Office of Water Programs. Surface Pollution Problems in the United States. Washington, D.C.: May, 1972.

U.S. Environmental Protection Agency, Office of Education and Manpower Planning. The Benefit-Cost Relationship in Entry Job Training in Water Distribution. September, 1973.

U.S. Environmental Protection Agency, Office of Solid Waste Management Programs. The Demonstration of Systems for Recovering Materials and Energy from Solid Waste, by John H. Skinner. 1974.

U.S. Environmental Protection Agency, Office of Research and Monitoring. The Quality of Life Concept - An Anthology from 1972 EPA Symposium. Washington, D.C.: August, 1972.

U.S. Environmental Protection Agency, Office of Public Affairs. Toward Cleaner Water - The New Permit Program to Control Water Pollution. 1974.

U.S. Environmental Protection Agency, Office of Water Supply. Training Strategy. October 21, 1976.

U.S. Environmental Protection Agency, Office of Research and Development. Who's Who II in the Interagency Energy/Environment R & D Program. October, 1976.

U.S. Environmental Protection Agency. Work Plan Handbook for Section 208 Areawide Waste Treatment Management Planning. February, 1975.

U.S. Environmental Protection Agency. "Worker Protection Standards for Agricultural Pesticides." Federal Register. Vol. 39, No. 92, May 10, 1974.

U.S. Federal Energy Administration. Careers in Energy Industries. 1975.

U.S. Federal Energy Administration. Directory of State Government Energy-Related Agencies. September, 1975.

U.S. Federal Energy Administration, National Energy Information Center. Review and Evaluation: Presidential Task Force on Power Plant Acceleration. August, 1976.

U.S. Federal Energy Administration. Project Independence Blueprint Final Task Force Report: Labor Report. Washington, D.C.: November, 1974.

U.S. Federal Energy Administration, Presidential Task Force on Power Plant Acceleration. Status Significant U.S. Power Plants In Planning or Under Construction. July 1, 1976.

U.S. Federal Power Commission. Federal Power Commission 1975 Annual Report. 1975.

U.S. Federal Power Commission. The Federal Power Commission: What it is and What it Does. Washington, D.C.: 1977.

U.S. Nuclear Regulatory Commission. Construction Status Report - Nuclear Power Plants - Data for Decisions. December, 1976.

U.S. Nuclear Regulatory Commission. Operating Units Status Report - Licensed Operating Reactors - Data for Decisions. March, 1976.

U.S. Virgin Islands, Department of Conservation and Cultural Affairs, Division of Natural Resources Management. Air Pollution Control Program - 1975 Annual Report. July, 1976.

U.S. Virgin Islands, Department of Conservation and Cultural Affairs, Division of Natural Resources Management. Pesticide Control Program. January, 1977.

U.S. Virgin Islands, Department of Conservation and Cultural Affairs, Division of Natural Resources Management. Report on Water Quality, Virgin Islands, U.S. of A. 1970 - 1975. June, 1975.

U.S. Virgin Islands, Department of Conservation and Cultural Affairs. Virgin Islands Territorial Plan for Certification of Commercial and Private Applicators of Restricted Use Pesticides. Febraury, 1976.

U.S. Virgin Islands, Department of Health, Division of Environmental Health. Air Quality Control Implementation Plan for the U.S. Virgin Islands. 1972.

Reports

Alabama Department of Public Health, Environmental Health Administration, Division of Public Water Supplies. Evaluation of the Semi Public Water Supplies in Alabama. Montgomery: Alabama Water Improvement Commission, 1975.

Alabama Water Improvement Commission. 1973-1974 Biennial Report. 1974.

American Chemical Society. Solid Wastes - An Environmental Science and Technology Reprint Book. Washington, D.C.: American Chemical Society, 1971.

American Iron and Steel Institute. Summary Report of Solid Waste Processing Facilities. Washington, D.C.

American Public Health Association. Public Exposure to Ionizing Radiations. New York: American Public Health Association, 1958.

American Society of Civil Engineers. Ground Water Management. New York: American Society of Civil Engineers, 1972.

American Society for Testing and Materials. Biological Methods For the Assessment of Water Quality. Symposium Proceedings. Philadelphia: American Society for Testing and Materials, 1973.

Association of Boards of Certification for Operating Personnel in Water and Wastewater Utilities. Roles and Responsibilities for Developing a Comprehensive State Water and Wastewater Operator Training Program. Prepared for the U.S. Environmental Protection Agency, Office of Water Program Operations. July, 1976.

Atlanta Regional Commission. Chattahoochee Corridor Study. Atlanta: July, 1976.

Atlanta Regional Commission. Possibilities for Water Conservation in the Atlanta Region. Atlanta: March, 1976.

Baker, Robert A. Taste and Odor in Water: A Critical Review. Manufacturing Chemists Association Report F-A233. May, 1967.

Blair, Louis H. and Schwartz, Alfred I. How Clean is Our City? A Guide for Measuring the Effectiveness of Solid Waste Collection Activities. Washington, D.C.: Urban Institute, 1972.

Bloom, Sandra C. and Degler, Stanley E. Pesticides and Pollution. Washington, D.C.: Bureau of National Affairs, 1969.

Boyd, Eldon M. Protein Deficiency and Pesticide Toxicity. Springfield. Ill.: Thomas, 1972.

Burke, Jacqueline M. and Fisher, Westin A. The Realities of Recycling. Minneapolis: Minnesota Pollution Control Agency, 1973.

Committee on Boundary Noise. The Regulation of Steady-State Noise Sources at Boundaries in Municipalities of North Carolina. North Carolina: September, 1973.

Committee of Tin Mill Products Producers, American Iron and Steel Institute. Progress Report on Recycling. Washington, D.C.

Committee of Tin Mill Products Producers, American Iron and Steel Institute. Restrictive Container Legislation. Washington, D.C.: March, 1976.

Cornell, Howland, Hayes, Merryfield, Clair A. Hill and Associates. Wastewater Treatment Plant Staffing Guidelines. Prepared for U.S. Environmental Protection Agency. October, 1972.

Coughlin, R. W. Air Pollution and Its Control. New York: American Institute of Chemical Engineers, 1972.

Dasmann, Raymond F., et al. Ecological Principals for Economic Development. Prepared for the International Union for Conservation of Nature and Natural Resources, and the Conservation Foundation. New York: J. Wiley, 1973.

Degler, Stanley E. and Bloom, Sandra C. (eds.). Federal Pollution Control Programs: Water, Air, and Solid Wastes. Washington, D.C.: Bureau of National Affairs, 1969.

Frost, and Sullivan, Inc. The Solid Waste Control Market. Report 141. May, 1972.

Gendel, Eugene B., et al. Manpower Analysis: Municipal Wastewater Treatment Facilities in New England. Prepared for U.S. Environmental Protection Agency. October, 1972.

Georgia State Board of Examiners for Certification of Water and Wastewater Treatment Plant Operators. Water and Wastewater Operator Certification in Georgia - Progress Report, July 1, 1975 - June 30, 1976. Atlanta, 1976.

Goldstein, E., et al. Air Pollution and Methods of Control. New York: MSS Information Corp., 1973.

Gould, Robert F. (ed.). Organic Pesticides in the Environment. Washington, D.C.: American Chemical Society, 1966.

Groman, William A. Forest Fertilization. Prepared for U.S. Environmental Protection Agency. Washington, D.C.: August, 1972

League of Women Voters Education Fund. Municipal Sludge: What Shall We Do With It? Current Focus Series Publication No. 627. 1976.

League of Women Voters Education Fund. Recycle - In Search of New Policies for Resource Recovery. Publication No. 132. Washington, D.C.: 1972.

League of Women Voters Education Fund. Solid Waste - It Won't Go Away. Current Focus Series Publication No. 675. April, 1971.

League of Women Voters Education Fund. Solid Waste Management: The National Issues. Community Guide Series Publication No. 134. 1972.

League of Women Voters of the United States. Study of Solid Waste Management. Community Guide Series Publication No. 699. November, 1971.

Lee, Lester. Smog: A Report to the People. Pasadena: California Institute of Technology, 1972.

Mackinney, H. W. Disposal of Plastics With Minimum Environmental Impact. American Society For Testing and Materials Special Publication 533. Philadelphia: 1973.

McClellan Air Force Base. Interim Report on Pilot Programs for Pesticide Monitoring of Water on Air Force Bases. National Technical Information Service Report AD-751 894. December, 1969.

Moreau, David H., et al. Regional Water Resource Planning For Urban Needs. Raleigh: Water Resources Research Institute of the University of North Carolina, 1973.

National Academy of Sciences. Report on Motor Vehicle Emissions to the EPA. Washington, D.C.: National Academy of Sciences, 1973.

National Association for Environmental Education. Current Issues in Environmental Education-1975: Selected Papers From the Fourth Annual Conference of the National Association for Environmental Education. Edited by Robert Marlett. Columbus: The ERIC Center for Science, Mathematics and Environmental Education, 1975.

National Association for Environmental Education. Current Issues in Environmental Education - II: Selected Papers from the Fifth Annual Conference of the National Association for Environmental Education. Edited by Robert Marlett. Columbus: The ERIC Center for Science, Mathematics and Environmental Education, 1976.

National Center for Resource Recovery. Putting Solid Waste and Resource Recovery in Perspective. Washington, D.C.: 1976.

National Field Research Center, Inc. An Environmental Manpower Projection Study. 7 Volumes. Prepared for U.S. Environmental Protection Agency and the Illinois Board of Higher Education. Iowa City, Iowa: 1975.

National Field Research Center, Inc. State of Illinois, Environmental/ Energy Education in the Pubic Community College System. Prepared for U.S. Environmental Protection Agency and the Illinois Board of Higher Education. Iowa City, Iowa: 1975.

National Planning Association. The Demand for Scientific and Technical Manpower in Selected Energy-Related Industries, 1970-1985: A Methodology Applied to a Selected Scenario of Energy Output. A Summary.

North Carolina Agricultural Extension Service. North Carolina Pesticide Training Manual. September, 1973.

North Carolina Water Resources Research Institute. The Effects of Sewer Surcharges on the Level of Industrial Wastes and the Use of Water By Industry. National Technical Information Report PB-213 267/8. August, 1972.

Olympus Research Corporation. Manpower Planning for Wastewater Treatment Plants. Prepared for the U.S. Environmental Protection Agency, Office of Water Programs.

Patterson, W. L. and Banker, R. F. Estimating Costs and Manpower Requirements for Conventional Wastewater Treatment Facilities. Prepared for the U.S. Environmental Protection Agency, Office of Research and Monitoring. October, 1971.

South Carolina Department of Education. Environmental Education: A Source Book for Educators. Columbia: South Carolina Department of Education, 1976.

Southwest Georgia Planning and Development Commission. Energy Management and Conservation in the 14-County Southwest Georgia APDC. Camilla: January, 1976.

Spindletop Research, Inc. Economic Situation Issues Description: Coal Mining. Prepared for the Kentucky Development Cabinet. June, 1974.

Spindletop Research, Inc. Kentucky's Coal Manpower: An Updated Assessment of Needs and Availability for Increased Production through 1985. Prepared for the Kentucky Development Cabinet. December, 1974.

Stern, Carlos, et al. Impacts of Beverage Container Legislation on Connecticut and a Review of the Experience in Oregon, Vermont and Washington State. Report to the Connecticut State Legislature, Department of Environmental Protection, by members of the University of Connecticut Department of Agricultural Economics. March 12, 1975.

Tennessee Valley Authority. 76 Annual Power Report. Knoxville: Tennessee Valley Authority, 1976.

Tennessee Valley Authority. TVA 75 Annual Report. Knoxville: Tennessee Valley Authority, 1975.

Virginia Polytechnic Institute and State University. Improving Water Quality by Removal of Pesticide Pollutants with Aquatic Plants. National Technical Information Service Report PB-495/6. August, 1972.

Young, Dennis. How Shall We Collect the Garbage? A Study in Economic Organization. Washington, D.C.: Urban Institute, 1972.

Zinger, Clem L., et al. Environmental Volunteers in America: Findings and Recommendations of the Steering Committee of the National Center For Voluntary Action (NCVA) Environmental Project. Washington, D.C.: National Center For Voluntary Action, 1973.

Unpublished Material

Agee, James L. Remarks before the Association of American Pesticide Control Officials, Inc. Washington, D.C.: April 7, 1975.

American Chemical Society. Photochemical Smog and Ozone Reactions. Conference Proceedings. Washington D.C.: American Chemical Society, 1972.

Baylay, Dr. Ned T. Management Decisions Regarding Farm Chemicals. Paper presented at 1971 National Agricultural Outlook Conference. Washington, D.C.: U.S. Department of Agriculture, 1971.

Cairns, John, Jr. and Dickson, K. L. (eds.). Biological Methods for the Assessment of Water Quality. Symposium proceedings of the American Society for Testing and Materials. Philadelphia: American Society for Testing and Materials, 1973.

Sopper, William E. and Kardos, Louis T. (eds.). Recycling Treated Municipal Wastewater and Sludge Through Forest and Cropland. Symposium proceedings, Pennsylvania State University. University Park: Pennsylvania State University, 1973.